Light and
LIGHTING

APRIL — MAY · PRICE 2s.

GROWTH

growth of leaves and roots must keep a fine nce if a plant is to thrive. Many a promising rish of foliage has withered to nothing through fficient root formation.

present-day expansion in the use of electric ting is no top-heavy growth for it is based on a industry whose roots are deep and constantly eloping.

research organisations of members of E.L.M.A. are elessly exploring new ground and probing for improvements. This basic work is invaluable and results are to be seen everywhere. On it rests the ess of every lighting application and so long as it skilfully handled as it is today by members of M.A., it is certain that the demands of those apply lighting will be met by an imaginative and pathetic response from those on the research and ufacturing sides of the British lamp industry.

trated—Syngonium Vellozianum. Also known as the Goose t, this is one of the less familiar varieties for the indoor ener. It is hardy and easy to grow but it is important that eaves should be frequently washed to allow the plant to breathe.

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contents

A Universal Topic

AS a topic, the subject of lighting is of world-wide interest, since the need for lighting is universal. There is, fortunately, no "country of the blind"—except in the imaginative writings of a twentieth-century novelist—and so there is no country in which lighting techniques and lighting practice are not actually or potentially "live" topics. We are very mindful of this, and our Editorial policy is to keep our readers in all countries informed about developments not only in our own country but also in others. The special feature of this issue—the "International Random Review"—is one which highlights this policy. It is a pleasing fact that readers of this Journal abroad are a growing company; indeed, their number is increasing at a more rapid rate than that of home subscribers. We have, of course, correspondents in numerous countries who are valuable sources of information, and a glance at the Lighting Abstracts, which we publish regularly, shows that we are not parochially minded as to the lighting literature of which we take account.

Notes and News

DETAILS of the meeting of the Association Française des Eclairagistes, to take place at Tours from June 5 to 9, are now available. The meeting opens on the evening of the 5th with the inauguration of a new sound and light spectacle; the next four days are fully occupied by 16 papers and a number of very attractive social events.

The subjects of the papers are briefly as follows: Colour and Lighting Practice (Jean Maisonneuve), Physiological Aspects of School Lighting (Dr. Dubois-Poulsen), Technique of School Lighting (Merry Cohu), Evolution of Lighting Equipment for Black and White and Colour Cinematography (Jean Vivie), Xenon Lamps and Their Application (Lemaigre-Voreaux), Application of Germicidal Lamps (La Toison), Application of Plastics in Lighting (Georges Favre), Standardisation of Light Sources and Accessories (Henri Thesio), Standardisation of Lighting Equipment (Robert Blancherie), Lighting and the Electricity Supply Industry (Chazal), Public Lighting in Belgium (Van Mossevelde), Public Lighting in Geneva (Louis Carlo), The New Lighting on the Champs Elysees (Andre Herzog), Lighting of Road Tunnels at Havre (Huet), Light and Colour (Yves Le Grand).

This is an impressive list of papers covering many subjects of particular interest to lighting engineers at the present time.

The social events include visits to the sound and light spectacles at Chambord and Chenonceaux, a dinner and a lunch to close the meeting. There is also a special programme for the ladies.

This meeting has been carefully arranged so that it does not clash with the I.E.S. meeting at Harrogate and it is hoped that a number of people from this country will be present at Tours. Full details of the meeting and registration forms can be obtained from the I.E.S. Secretary.

I.E.S. Register of Lighting Engineers

It is announced by the I.E.S. Council that as from October 1, 1957, the examination qualification for inclusion in the I.E.S. Register of Lighting Engineers will be a Final Certificate of the City and Guilds of London Institute in illuminating engineering instead of the Intermediate Certificate which is at present required. The qualifying period of five years in the practice of illuminating engineering will remain the same.

The Final Grade examinations consist of three papers; a Final Certificate may be obtained by passing in Papers 1 and 2 or in Papers 1 and 3. As the results of the City and Guilds examinations are announced during the summer students taking the Intermediate examination in May, 1957, and obtaining a pass will be able to apply for inclusion in the Register before the change comes into effect.

The change will increase the status of the Register and its value to those included in it. It is understood that the majority of applicants already hold a Final Certificate.

Physical Society Exhibition

The Physical Society's 1956 Exhibition will be held from May 14 to 17 in the Old and New Halls of the Royal Horticultural Society, Westminster. The size of the exhibition is expected to be similar to that of last year but the extra space available will make for easier access for visitors.

The policy of the society, to show as much as possible of that which is novel and new, has not been changed, and it is expected that the standard of the exhibition in 1956 will be higher than ever before. In addition a greater number of universities, colleges and research organisations have agreed to take part, thus increasing the proportion of purely research exhibits. As is usual, exhibits will show the trend of instrumentation in industry, research, and teaching for the next 12 months. Prominently displayed will be much equipment concerned with the peaceful use of atomic energy. Other exhibits include theoretical and practical work showing developments and application of computers; in particular their application to automatic control in industry.

The 1956 exhibition, which is the fortieth of the series, will include 131 exhibitors, and will show the ever increasing contribution that British science is making to national and international prosperity.

As in the past, a number of demonstration-lectures are to be given during the course of the exhibition. At 6.15 p.m. on Monday, May 14, Mr. H. G. Jenkins will lecture on recent developments in light sources.

and on the Wednesday a lecture on colour television is to be given by Mr. G. G. Gouriet, of the B.B.C. Research Laboratories.

Visitors tickets, available for one day only, may be obtained on application (enclosing a stamped and addressed envelope), to the Physical Society.

Colour and Kippers

The full title of a lecture given recently by Mr. G. J. Chamberlin, of Tintometer, Ltd., to the Colour Group was "Kippers, Cocktails, Confectionery and Colour." Such a lecture had to have convincing demonstrations and the author had before him a vast array of familiar comestibles, although some of them had quite unusual and unfamiliar colours; kippers were conspicuous by their absence.

Mr. Chamberlain said that the colour of foodstuffs was important chiefly for three reasons. One was that the consumer had highly developed colour preferences which controlled his choice. Great care was taken in many countries, often by legal prescription, to ensure that the colours of the products they exported, e.g., butter, fruits and especially tomatoes, were those most acceptable to the consumer. In passing, the lecturer mentioned that preferences were sometimes quite local, and he instanced the preference of the Manchester housewife for a more colourful cheese than that which best suited her London cousin. The second function of colour in food was its use in grading, selection and processing. Great emphasis, said Mr. Chamberlin, was placed by many firms on the maintenance of a particular colour for their product; a paler colour would nearly always bring complaints that the product was stale. Finally there was the use of colour by the analyst in his work of safeguarding the consumer and improving the product. At the conclusion of the lecture the chairman, Mr. R. G. Horner, took up Mr. Chamberlin's challenge and consumed with obvious enjoyment a portion of cake coloured a brilliant blue throughout, but it was noticeable that he eschewed the bright green sausages.

C.I.E. Proceedings, 1955

The Proceedings of the Thirteenth Session of the International Committee on Illumination, held in Zürich last June, have now been published. These Proceedings are in two volumes, each containing about 800 pages and including in all more than 300 black and white photographs and 12 colourprints. The arrangement followed is that each Secretariat Report is accompanied by the corresponding Recommendations and the minutes of the committee meeting or meetings, together with the associated papers. In this way all material concerned with any particular subject is grouped together for easy reference. The minutes of the Plenary Sessions and some general reports and announcements are also included. The Recommendations will also be published as a separate booklet.

The two volumes of the Proceedings and the booklet of Recommendations can be ordered at the cost of £5 5s. from the Honorary Secretary of the National Illumination Committee, Mr. L. H. McDermott, at the National Physical Laboratory, Teddington, Middlesex.

The Vienna State Opera

The world-renowned State Opera House of Vienna, and the almost equally well known Burgtheater, which were destroyed during the last few weeks of the war have now been rebuilt and were opened, the latter in October and the former in November last. The auditorium of the State Opera House, which accommodates over 2,000 people (1,658 seated and 551 standing), is of more or less conventional design and the lighting follows the usual pattern, with bracket lights on the fronts of the boxes and massive fittings mounted on the ceiling. The same may be said of the auditorium of the Burgtheater, which is somewhat smaller (1,256 seats and standing room for 364).

The stage lighting in both houses is naturally of the most modern design and is on a very elaborate scale. In the Opera House, with a proscenium opening nearly 50 ft. wide and 40 ft. high, and a depth of stage of over 150 ft., the lighting load is some 1,000 kvA. It is interesting to notice banks of footlights which can be lowered at will and among which it is possible to mount individual projectors if desired. The control board is of impressive size and is correspondingly complex. Not only are the colours and intensities of the different lights in use variable at will but many of the spotlights can be aimed from this board by means of small local motors giving sideways swing or upward and downward tilt.

Both stages have a cyclorama and among the sources used for illuminating these, banks of fluorescent lamps of a special type have been included. These provide bluish light the tone of which can be altered at will by the use of colour filters. They can be dimmed to an exceedingly low value (1/60,000 of full intensity) without extinction. A large cloud machine is provided for the production of cloud effects. It is clear that nothing has been spared which could make the installations worthy of what many regard as the home of opera.

International Random Review

This review is based on information supplied by correspondents in 16 countries. Every contribution, did space but permit, could have been published as a separate article. As it is, some selection had to be made and what follows we hope is representative of lighting trends in various parts of the world.

On the whole the picture is one of steady progress and better understanding in using existing materials and known techniques. Several countries report a growing interest of lighting matters amongst architects and a willingness on the part of the architect to seek the advice of the lighting engineer. Not all countries are equally fortunate in the means at their disposal. and those without large manufacturing facilities are having to do the best they can with limited ranges of light sources and equipment. There are, no doubt, handicaps and restrictions of one sort or another in most countries, but the lighting industry and lighting engineers everywhere are providing a valuable service to the communities of the world.

Light Sources

News of substantial changes in the construction of high-wattage tungsten lamps comes from the United States. By mounting coiled coil filaments in the vertical position it is claimed that the operating temperatures can be increased without reducing the life. Thus increases in light output from six to 15 per cent. are achieved. The greatest advantage is claimed for the higher wattages—750 and 1,000—using the thickest filament wire. Application of the technique to the lower wattages is forecast but with less advantage. These claims refer to the low voltages (115-120) common in the United States, and presumably the technique is less attractive with the thinner filaments associated with the 200-250-volt circuits standard in other parts of the world.

Large sales are also reported in the United States and Canada of medium-wattage tungsten lamps with a very pale pink coating which adds glamour to the domestic interior.

In New Zealand during the last year or two fairly large quantities of Continental pendants and brackets have been imported, resulting in an increased demand for the decorative types of filament lamps. It is also reported from New Zealand that the introduction of 240-volt 100-watt single-coil lamps has been popular with the street-lighting authorities who find that they stand up better than the coiled-coil lamp to the climatic conditions of the country.

Additions have been made to the range of PAR lamps in the United States. A new 200-watt PAR medium-flood lamp giving a more or less rectangular beam pattern is coming into use for shop lighting and general floodlighting. Other additions are a 300-watt lamp of similar pattern and a 500-watt narrow spot.

The use of fluorescent lamps seems to be expanding everywhere. In the Scandinavian countries the "de luxe" colours, particularly the "de luxe warm white," are being increasingly used and are popular in shops, offices and schools. The "new warm white" lamp has created a new interest in fluorescent lighting in New Zealand, where the "de luxe warm white," though providing a useful addition to the range of lamps, has so far received limited use. It is not surprising that in Argentina the majority (95 per cent.) of the fluorescent lamps in use are of the cooler colours. In Belgium the "standard white" (4,200 deg. K) (equivalent to British "Daylight") and the "de luxe white" (equivalent to British "natural") are still the best sellers. In the United States the popularity of "cool white" (British "Daylight") continues to grow, and now represents over 60 per cent. of sales; it has almost entirely replaced the obsolete "3,500 white" which has fallen from nearly 70 per cent. to less than 10 per cent. of sales. The 4-ft. 40-watt is still much the most popular size in the United States, but the 8-ft. 100-watt is growing rapidly in demand.

The quantities of fluorescent lamps made in both Italy and Yugoslavia is steadily increasing. Finland is now making the 8-ft. slimline lamp. In Italy import of lamps is restricted to special types such as the circular lamp. Some manufacturers in Italy are now producing lamps with two cathodes at each end which, it is claimed, ensures longer life, especially if the lamps are used with instant-start ballasts.

Philips have recently introduced on the Continent the

reflector type of fluorescent lamp. This lamp, which was also introduced by British manufacturers about the same time, has a special reflector coating over about two-thirds of the tube diameter so that the light output through the remainder of the tube is increased. The lamp is intended mainly for use in dirty atmospheres where accumulation of dirt on reflectors has more than the usual nuisance value; no reflector need be used, and dirt settling on the top of the lamp is of little importance, as only a small proportion of the light output is in the upward half.

It is reported from the United States, and it may apply to other countries, that there is a marked tendency towards the use of starterless ballasts (" Rapid Start "). For example, A.C.E.C. in Belgium market a ballast containing a small transformer which causes rapid preheating of the cathode on starting. It is understood that this ballast should be used only with special lamps having reinforced cathodes—if ordinary lamps are used their life is considerably reduced. In Britain normal lamps, but with an earthed external stripe, are used with starterless circuits (" Instant Start," " Quick Start ").

A new line of 400- and 1,000-watt weatherproof heavy duty mercury and fluorescent-mercury lamps suitable for indoor and outdoor use has been announced in the United States. Some manufacturers are making guarantees to cover the full rated life of mercury lamps.

The Osram Company in Germany is now manufacturing mercury vapour lamps in the 80-, 125-, and 400-watt sizes. The same company has also introduced a 50-watt colour-corrected mercury lamp.

The colour-corrected mercury lamps appear to be gaining favour in many countries, including Spain, Belgium and Italy, for street lighting. Most other countries are also interested but the high cost is discouraging authorities from making use of it. The lamps between 80 and 400 watts are generally used; experience with the 700- and 1,000-watt lamps seems to be limited. In Belgium new installations are usually of the 250- or 400-watt lamps.

It is understood that Yugoslavia will shortly be manufacturing both mercury and sodium lamps. Special control gear has been developed in Italy to enable mercury lamps to be used in series circuits.

There is little to report on the use of cold cathode lamps. The subways of Buenos Aires are now lighted by these lamps but they have not found favour elsewhere in Argentina mainly, we understand, because the lamps and their associated control gear, which are of local manufacture, are not of a very high standard.

Germany has been very active in the development of xenon lamps; during the year attention has been devoted mainly towards widening the field of application. Their use in cinematograph and television studios seems to be a most promising application on account of their constancy of light output and colour with voltage fluctuation. These lamps have also made an appearance in Sweden together with a device (details of which are not available) for colour control.

In the United States the 1,000-watt mercury xenon lamp has been redesigned to include a reflectorized coating covering slightly less than half the bulb. The purpose of the xenon filling is to increase the heating effect on starting, thereby obtaining more light immediately (25 per cent.) and full light output more quickly. This lamp is used in a naval 12-in. searchlight in place of a 1,000-watt tungsten projection lamp, thereby increasing the peak candle-power from 150,000 to 6,000,000. A 150-watt xenon lamp is used in an 8-in. naval searchlight.

Luminaires

The Scandinavian countries continue to turn out original designs for tungsten lamp luminaires. Of particular interest are those for ORNO of Finland, by Mrs. Johansson-Pape and Mr. Yki Nummi, both of whom have won prizes at the Milan Trienniale during recent years. Domestic luminaires in Sweden show a wider range of technically and aesthetically well designed equipment.

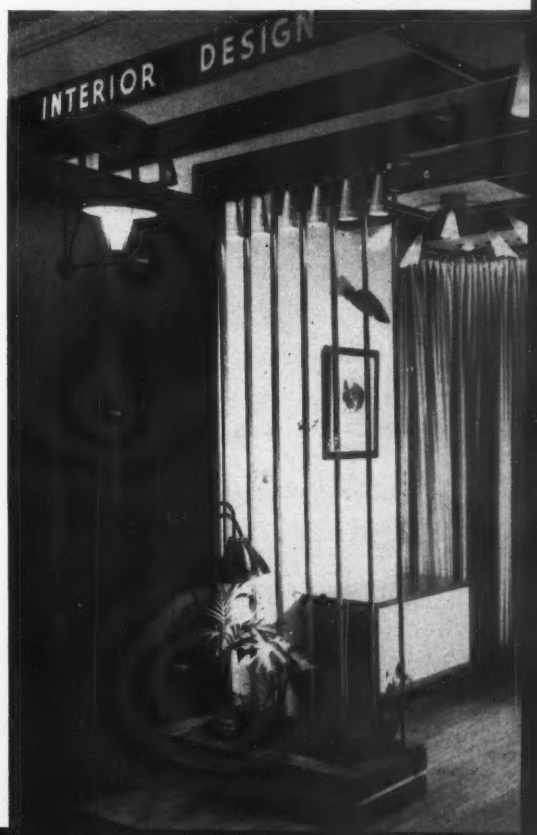
Scandinavian luminaires have found their way to Australia in large numbers and many architects there tend to rely upon them for their better installations. A few Australian manufacturers have, however, recently begun to produce better designs than formerly, as is shown in the illustration of luminaires designed by W. A. Smith and made in Sydney.

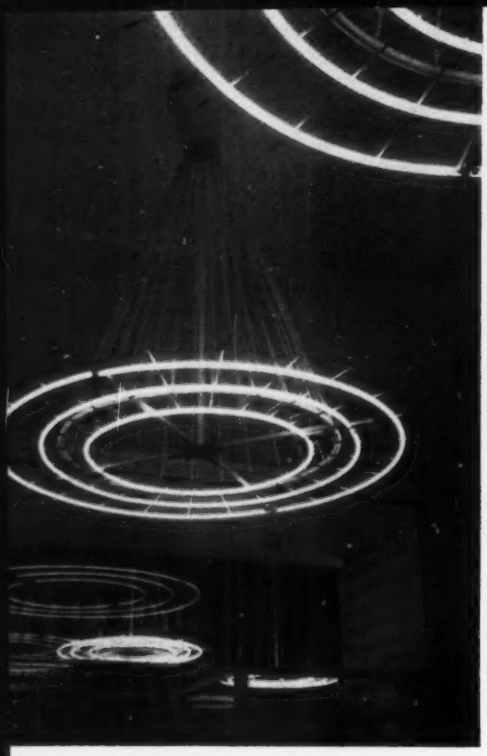
In Italy the trend with interior luminaires is to do away with all decorative elements whilst giving more attention to screening the light source.

In Yugoslavia most domestic luminaires are made by hand, as the greater part of the output of the manufacturers is of industrial-type luminaires with some commercial.

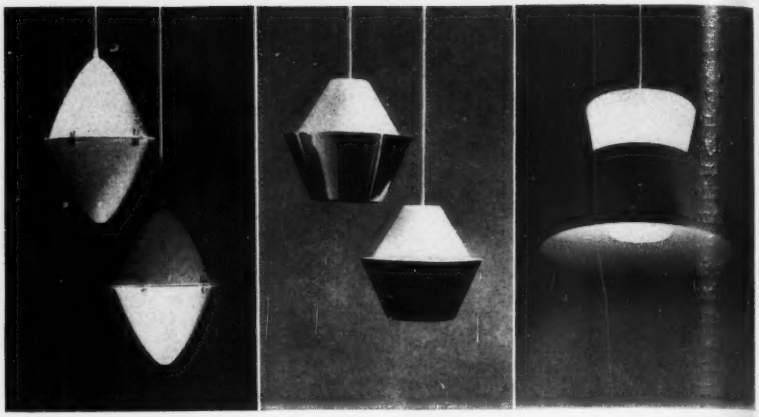
Great use would seem to be made in many countries of polished aluminium for fluorescent-lamp luminaires; in Germany it is also used extensively for large industrial units for mercury lamps. The design of reflectors for fluorescent lamps is being given particular study in Germany, and frequently special designs are produced for specific uses.

A display of modern luminaires manufactured in Australia. (W. A. Smith.)

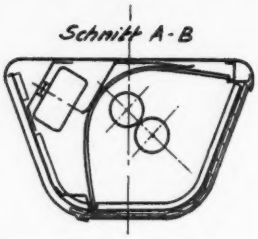




A cold cathode luminaire in a shop at Marseilles. (Claude, Paz et Silva.)

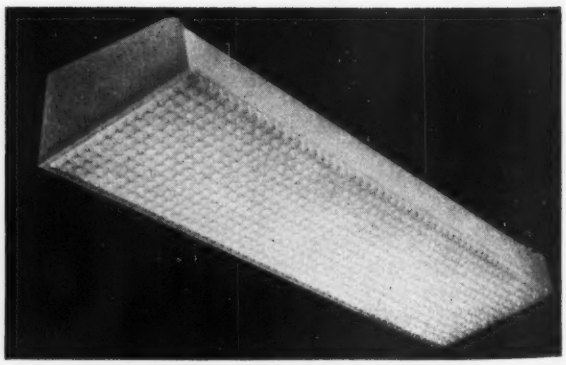


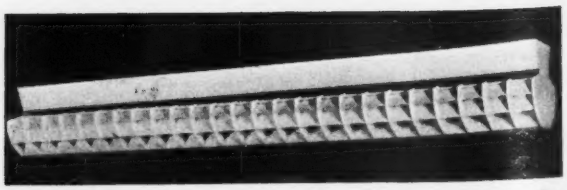
Three Finnish incandescent luminaires made of "Perspex," polished brass and colour sprayed aluminium. (Orno.)



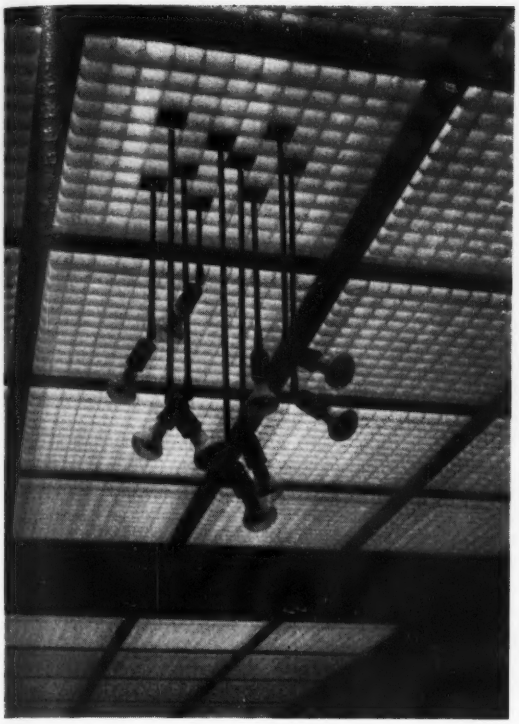
A section through a luminaire for interior lighting incorporating a directional reflector. (Zeiss Ikon.)

A chandelier used in Denmark House, Paris. (Fog & Mørup, Copenhagen.)

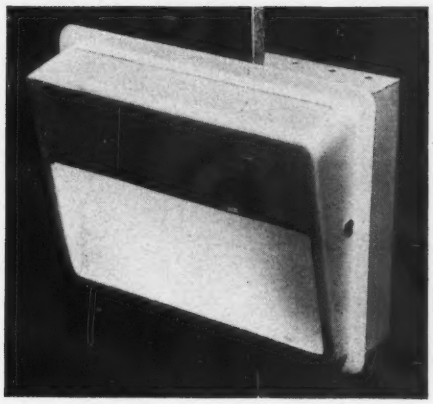


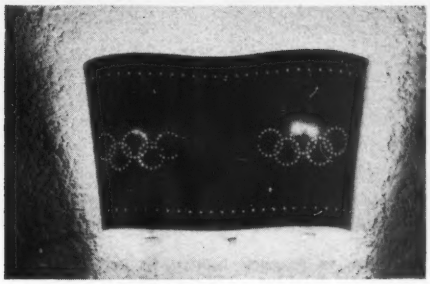


Two Swedish luminaires. Top, office lighting luminaire for installation over windows, incorporating polished aluminium reflector and plastic louvres. (Axel Anneil.) Bottom, school lighting luminaire. (Böhlmarks.)



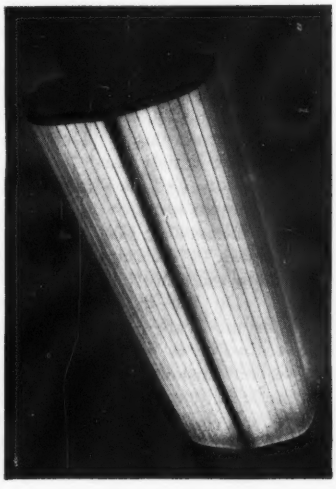
Pendant brackets from a louvred ceiling with 100-watt reflector spot lamps. (Ilum. S.A. Buenos Aires.)





Two Italian wall fittings. Top, recessed units. (Stilnovo.) Bottom, wall unit installed at the Ice Stadium, Cortina, for the Olympic Games. (Buini & Grandi.)

Left, Danish tungsten lamp pendant. (Lyfa.) Right, German luminaire for four fluorescent lamps. The diffusing material is of linked movable glass strips. (Siemens-Schuckert.)



Draw-type fittings in a sub-station which permit easy and safe access for servicing. (A.E.G. Frankfurt-Main.)

A square in Munich lighted by two rows of fluorescent lanterns. (Siemens-Schuckert.)

Part of the street lighting installed at Cortina for the Olympic Games. The lanterns are of simple design incorporating an opal glass diffuser and a varnished steel dome. (C.G.E. Milan.)

Street Lighting

Street lighting is a lively subject in all countries; we all seem to suffer from too many vehicles chasing along too few adequate roads. Research into street lighting and accidents in this country by the British Electrical Development Association and the Road Research Laboratory and also by organisations in the United States is studied carefully everywhere. In the United States the insurance people are enthusiastic supporters of good street lighting (and of other fields of lighting).

The British Codes of street lighting have also received careful attention in other countries. During the year a Code (DIN 5044) was issued in Germany; Sweden has a code in preparation and the Australian code is under revision. The Australians find the British Code inapplicable in their country as the roads there are much wider and many roads have a bitumen centre strip with earth sides and no defined curb line.

Most new lighting seems to be by fluorescent or by mercury (including colour-corrected) lamps. New installations of sodium lamps are reported from Sweden, Finland, Belgium and Switzerland, whilst the difference of opinion between Auckland and Wellington in New Zealand on the merits of mercury and sodium lamps continues.

A new installation of 61 140-watt enclosed sodium lanterns has been put along the waterfront at Wellington. Half of these, along one side of the road, had to be suspended from span wires, some of which extended up to 150 ft. Wellington is appropriately known as "Windy Wellington." To keep these lanterns steady a third span had to be erected running the whole length of the road. Auckland in the meanwhile is planning to install a further 750 mercury lanterns of the "Difractor" bowl type, which they find an efficient "maid of all work."

Some fluorescent street lighting has been installed in city centres in New Zealand, but, as reported last year, the cost is likely to prevent any large-scale adoption for some time. The only largish installation, now nearing completion, is of 31 "Three-Eighty" enclosed lanterns at Temuka, in the South Island.

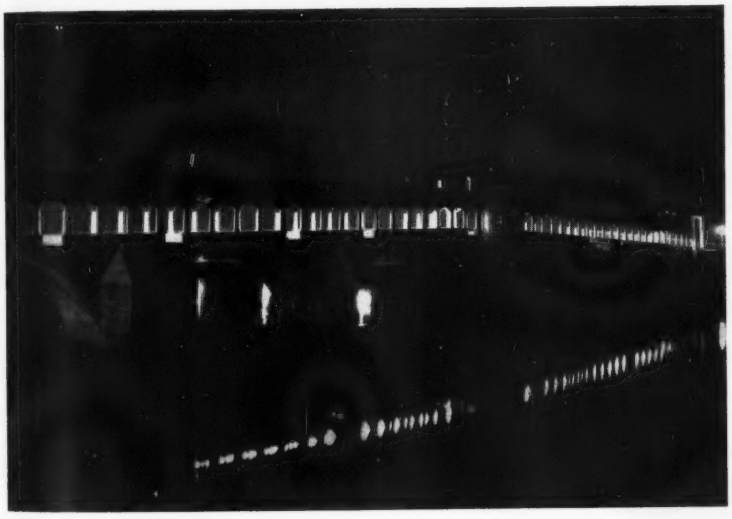
In both Norway and Sweden fluorescent lighting is being extended, but in Finland the winters are too cold for this type of lamp. In Finland inter-town roads are usually lit by mercury, colour-corrected mercury (finding increasing favour) or by mixed mercury and tungsten lamps. A cut-off sodium installation using aluminium reflectors and a "Perspex" bowl has given good results which may lead to further installations.

In Belgium most of the lanterns for mercury and sodium lamps are of the cut-off or semi-cut-off type. Fluorescent lanterns are usually non-cut-off. Illustrated is one of the many roads in Antwerp where 125-watt colour-corrected mercury lamp lanterns are used. It is reported that there are now more than 30,000 of these lanterns in use in that city and its surroundings. Decorative-type vertical fluorescent lanterns are widely used for residential streets in Belgium. They are equipped, as a rule, with two, three or four 20-watt lamps, though tungsten or mercury lamps are also used.

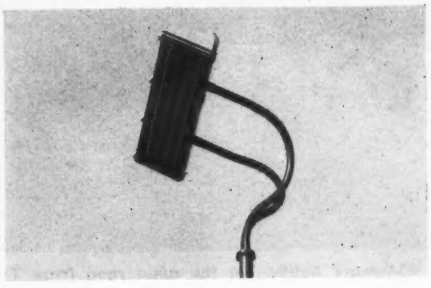
Two interesting and original installations in France are the lighting of the road over the Genissiat Barrage and the tunnel on the Autoroute de l'Ouest, both of which are illustrated. On the barrage the lighting units housing cold cathode tubes are recessed into the coping. The tunnel on the autoroute is 832 metres long and is lighted by means of 40-watt instant start white fluorescent lamps fitted with a simple louvre attachment; the control gear is housed in the boxes which can be seen in the illustration.

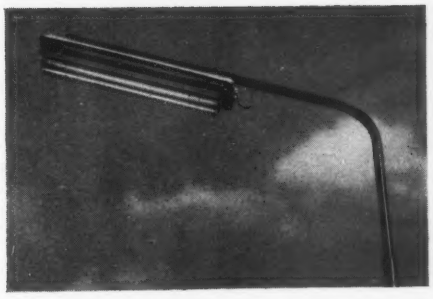
Both Germany and Italy have produced a wide variety of lanterns and columns in their search for equipment of

Two views of a new fluorescent lamp installation near the Courts of Justice in Milan. (Civardi.)



The Ponte Vecchio at Pavia illuminated by fluorescent lamps. (Esticino.)



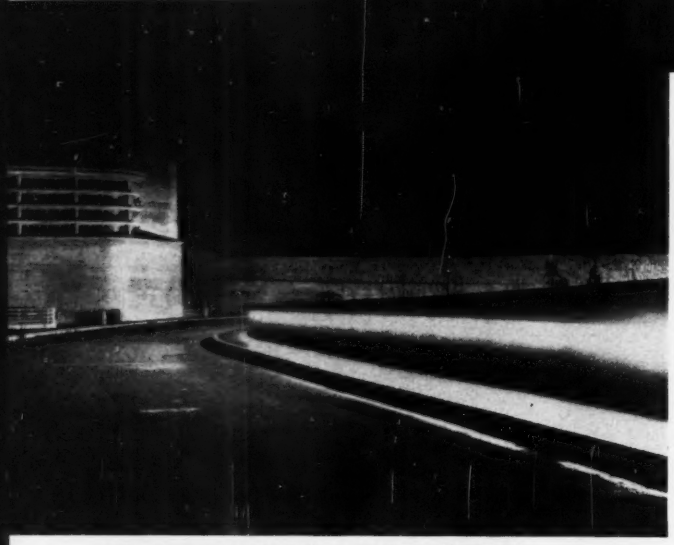


Two examples of Italian fluorescent lamp lanterns and brackets. (Civardi.)

attractive appearance by day. Indeed the German street lighting code, to which reference has already been made, demands that equipment be of attractive daytime appearance. Examples from both countries are shown.

The Winter Olympic Games at Cortina d'Ampezzo must have made a lot of work one way and another, including the provision of over 500 exterior and street lighting points. Two types of lantern were used and are illustrated.

Some interesting street lighting installations have been put into service at Como and Milan during the last few years and some have already been reported in *Light and*



The Barrage de Genissiat on which cold cathode units are recessed into the coping wall. (Philips, Paris.)

Mercury lighting in the main road from The Hague to the Hook of Holland at 's-Gravezande. (Philips, Eindhoven.)

Cut-off type mercury fluorescent lanterns on the road from Baar to Zug. (Philips, Zurich.)

Lighting (February, 1955). More recent ones are shown here. During the year a blended light installation (one 125-watt mercury and one 4,000 lumen tungsten lamp) has been put into operation in Milan.

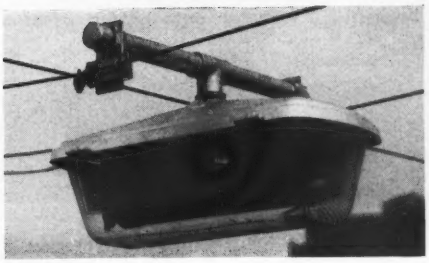
A report on street lighting progress in Madrid and future plans for that city has already appeared in this journal (February, 1955). During 1955 4,565 new units were put into service, including 20- and 40-watt fluorescent lamps, 250 and 400 mercury lamps and colour-corrected mercury lamps from the 80-watt to the latest 1,000-watt size. The city lighting engineer of Madrid was no doubt faced with a very difficult task of bringing the city's lighting up to date, but he would appear to be going about it with the utmost vigour.

As most of the electric street lighting in Yugoslavia is by tungsten lamps, recent trial installations of fluorescent lamps have met with popular approval and the demand for more.

In Argentina also the majority of street lighting is by tungsten lamps. Some mercury and sodium lamps were installed just after the war but, as their importation was restricted soon after they first came into use, the lanterns are at present being used with tungsten lamps. An installation of mixed mercury fluorescent and tungsten lamps is likely to be tried out in one of the main avenues of Buenos Aires during the present year.

Fluorescent lighting in the tunnel on the Autoroute de l'Ouest. (Philips, Paris.)

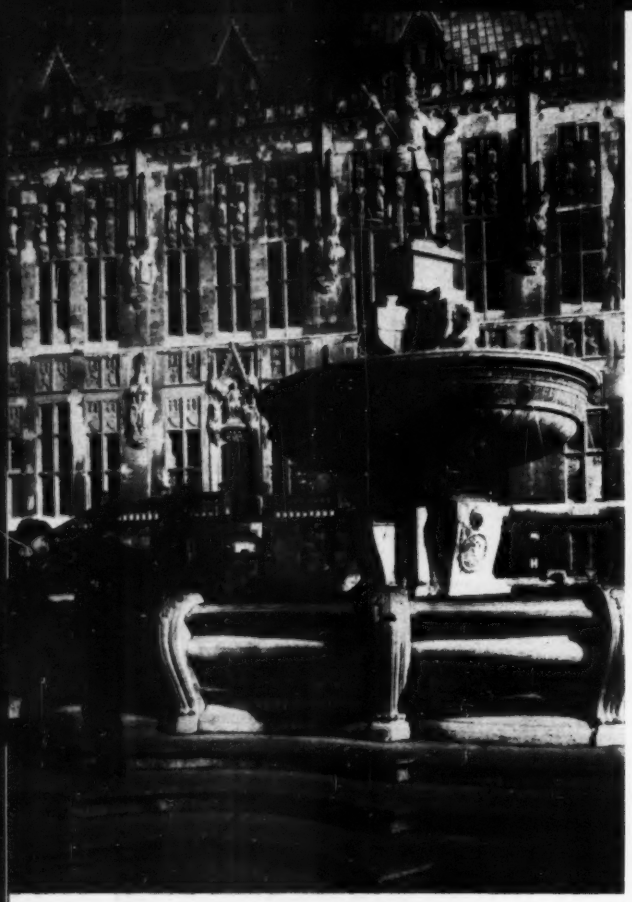
Special Infranor luminaire installed at Cortina. (C.G.E., Milan.)



Showing method of suspension of sodium lanterns on the waterfront at Wellington, New Zealand.

German street lighting lantern housing two colour corrected mercury lamps. (Schanzenbach.)

Installation of 125-watt colour corrected mercury lamp lanterns in the Avenue de Belgique, Antwerp. (Philips, Brussels.)



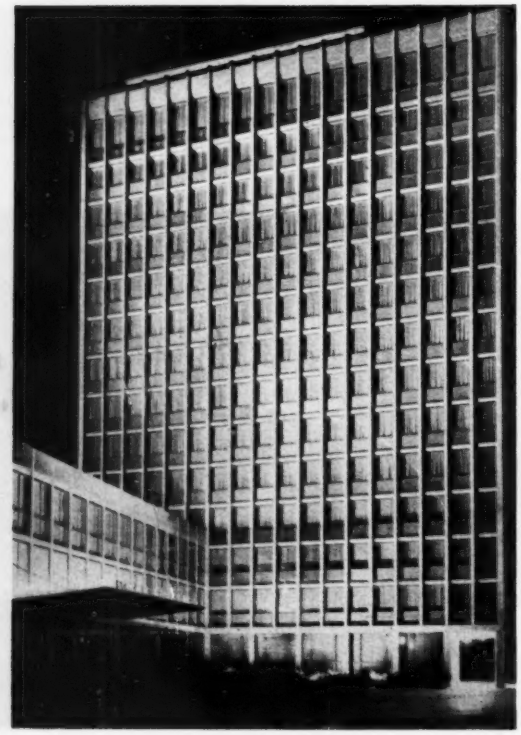
Floodlighting

Perhaps we are beginning to accept floodlighting as a normal thing. The number of examples which have been sent in by contributors is quite small—but every one is of a very high standard.

From Germany we have two interesting examples; one a large office building, the other the old and historical town hall at Aachen. They are examples of two different techniques; the office building demands sufficient light spread over a flat surface; the older building, with its beautiful reliefs, calls for more artistic treatment. The main frontage of the town hall faces north and never gets direct sunlight so that even during the day the modelling of the sculptures and carvings is never seen to advantage. The lighting engineer (Mr. Kilian) has arranged 36 projectors in three groups to give good modelling. His success is apparent from the illustrations.

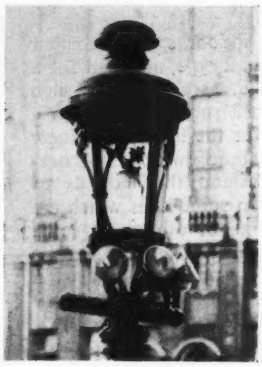
Another example involving old buildings is that of the Grand Place in Brussels. Here the problem appears to have been where to place the projectors; they have been placed on the roofs and in the attics of surrounding buildings. Small reflector spotlamps have been fitted to the existing lamp columns in the Place at a height of 3 metres to show up the gilt decoration on the façades. This is a busy part of Brussels but the installation has thus been designed so that no light is directed into the eyes of pedestrians. The old lamp columns, so well suited to the Place, have been retained but have been converted from gas to electric. This is another example where the pictures are more expressive than any number of words. The installation is without doubt one of the finest in Belgium.

Good results have also been obtained with projectors housing four 40-watt fluorescent lamps to light the Royal Church at Laeken. Tungsten projectors are used to light the upper part of the church.



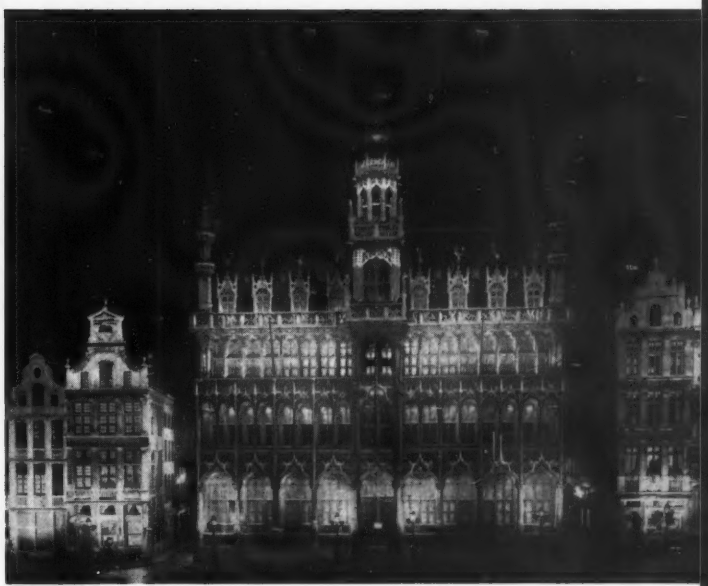
Two examples of floodlighting, both from Germany, showing the application of different techniques. Top, the Town Hall at Aachen. (Siemens-Schuckert.) Bottom, a large office building in Karlsruhe. (Zeiss Ikon.)

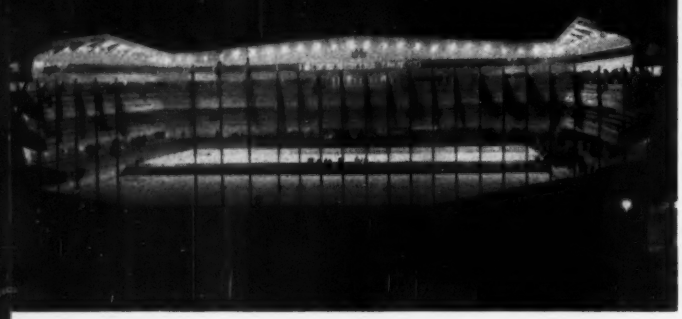
The Cathedral at Albi, floodlit by projectors equipped with 400-watt mercury lamps. (Claude, Paz et Silva.)



The pictures top and bottom show two views of the Grande Place in Brussels. The smaller picture in the middle shows the mounting of small spotlamps on the existing street lighting lanterns. (Service d'Electricite de la Ville de Bruxelles.)

The Chateau de Blois. (Mazda.)





The Olympic Stadium at Cortina. (Buini & Grandi.)

Sports Lighting

The majority of halls used for indoor sports, whether they be of the mammoth or village hall type, are used for a variety of purposes. The lighting, therefore, has to be such that it is suitable for anything from a social function to a basketball game, and it is not easy for the lighting engineer to strike a happy medium between lighting which is decorative yet sufficiently robust to withstand the hazards of sporting activities. There are, however, some halls which are temples to one form of indoor game or other and some interesting buildings have come into use during the year.

One such example is the new covered tennis courts in Brussels. There are three courts. Daylight is provided by a double glazed skylight and the artificial lighting equipment is placed between the two levels of glass. The glass absorbs about 25 per cent. of the light but as the diffusion of light is good and the ceiling brightness is relatively low this loss of light is acceptable. After 1,000 hours of operation the average illumination is 40 lm/ft^2. Lighting is provided from twin 40-watt fluorescent lamps in polished aluminium reflectors. There are 120 fittings over the centre of the court and 169 divided between the other two courts. (These courts will no doubt be well used as tennis takes second place only to bicycle racing as a Belgian national activity.)

The Brussels building is, of course, used only for tennis. An indoor sports arena at Nordstrandhallen in Oslo is used for tennis and other games. Here two continuous lines of fittings housing 80-watt fluorescent lamps give an average illumination of 20-30 lm/ft^2.

In Germany there is the Ostseehalle at Kiel, which measures 328 ft. by 196 ft. with a playing area of 210 ft. by 79 ft. and a ceiling height of just over 50 ft. Directional-type luminaires are recessed in pairs into the perimeter of the ceiling and adjusted to evenly light the playing area. Each luminaire houses one 500-watt tungsten lamp, and the average illumination is 15 lm/ft^2.

An interesting example of a smaller general purposes hall is provided by that of the Sportschule, at Grunberg, in Germany. Fluorescent lamps shielded by louvres are recessed into the ceiling as can be seen in the illustration. The average illumination is 34 lm/ft^2.

For outdoor sports one of the outstanding jobs of the year was the preparation of the Olympic Ice Stadium, at Cortina d'Ampezzo. Public stands were built in reinforced concrete on three sides of the stadium, inside which are two skating rinks each 30 by 60 metres, one lit to 30 lm/ft^2 and the other to 10 lm/ft^2. In order not to interfere with the roof line, floodlights (126 by 1,000-watt) are mounted just below the edge of the roof.

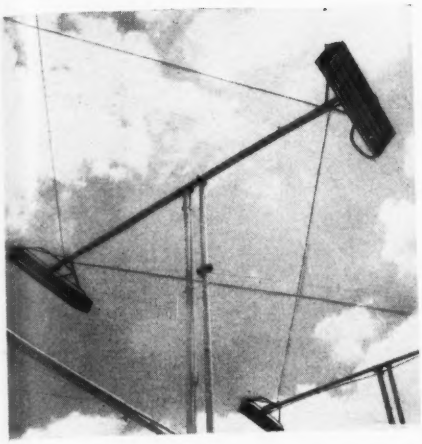
Another Italian installation of note is that lighting the dog-racing track at Milan. The track is 6 metres wide and 300 metres in circumference. It is lit by 15,000 lumen lamps in Infranor luminaires suspended 8 ft. above the track at a spacing of approximately 20 ft. The average illumination over the track is 20 lm/ft^2. The lamps are fed in series by means of two constant-current transformers fitted with devices for reducing the illumination between races.

New football-field installations include the Turin ground in Italy, in which a combination of pylons and roof mounting is used, and the largest football field in Copenhagen, where four 100-ft. steel towers each carry 15 1,500-watt Lyfa projectors. At Turin 96 1,500-watt floodlights are used with lamps rated at 73 volts but run at 80 volts. In Denmark a number of football training grounds have also been equipped with floodlighting.

The Australian climate is ideal for outdoor sports, and most of the year it is warm enough in the evenings to continue them. However, even in the summer it is dark by about 7.30 p.m., so that artificial lighting is needed for the thousands of tennis enthusiasts. The usual form of lighting is by tungsten-lamp projectors. Recently a few installations using fluorescent lamps have come into use. An illustration shows one method of mounting.

The Australians also have a night-time golf driving range. Twenty-one driving tees in a 120-ft. line face a fairway 250-300 yd. long. Three 1,000-watt wide-beam floodlights mounted at 35 ft. and two 1,000-watt narrow-beam floods at 8 ft. illuminate the fairway and make it possible to follow the flight of a ball even if well lofted; 500-w. lamps in parabolic angle reflectors, mounted at 20 ft., light the tees.

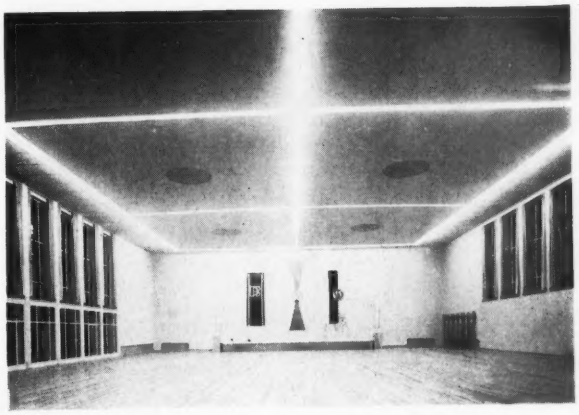
Dog-racing track at Vigorelli, Milan. (C.G.E., Milan.)



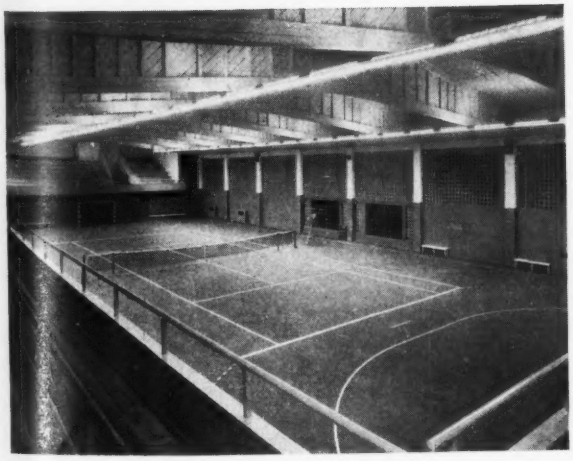
Showing a type of fluorescent fitting and method of suspension used for lighting tennis courts. (Sydney County Council.)

The Ostseehalle at Kiel. (Zeiss Ikon.)

The new covered tennis courts in Brussels. (Philips, Brussels.)



Gymnasium at Grunberg, in Germany. (Schanzenbach.)



Indoor sports arena at Nordstrandhallen. (Philips, Oslo.)

Other Exterior Lighting

Illustrated here is the new station at Heidelberg which was opened during the year. Some attention has been given to the lighting of railway platforms in Germany and special luminaires have been designed to give even illumination on the platform but to give a higher illumination on the edge of the platform and on the side of the train. Such luminaires are used at Heidelberg.

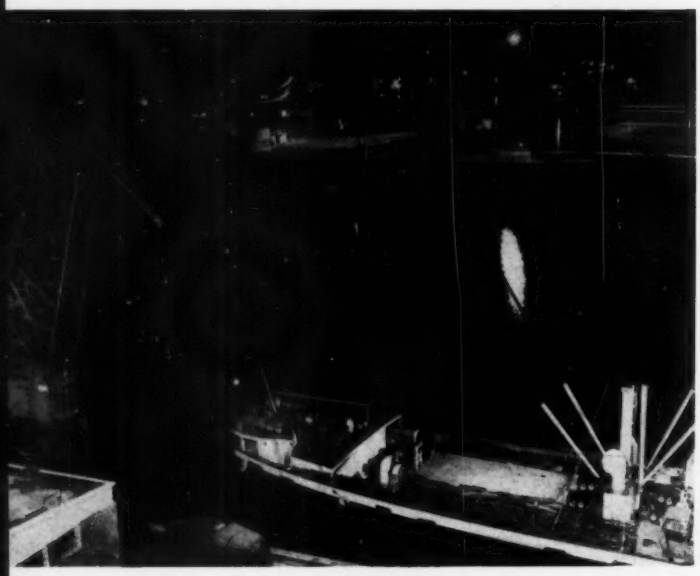
Fluorescent lighting is also used on reconstructed stations in Yugoslavia.

The dock lighting at Leghorn in Italy was reported in *Light and Lighting* (January, 1954); an additional 35-metre tower has been installed equipped with three 3,000-watt Infranor projectors and three 1,000-watt mercury lamp floodlights. Installations have been carried out at Civitavecchia and at Porto Torres and Carbina in Sardinia where mercury, sodium and colour-corrected mercury lamps have been extensively used.

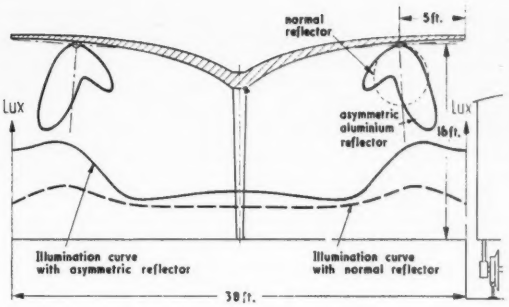
The port of Turku in Finland has been lit by 100-ft. towers mounting 1,000-watt long range projectors at each end of the quay. An installation for the Mercantile Marine Engineering Company at Antwerp shows an interesting form of dry dock lighting, 140-watt sodium lamps spaced about 3 metres apart being recessed into the concrete wall at the bottom of the dock.

From Copenhagen we learn that the Calvert system of approach lighting has been installed at the airport at Kastrup and that at 10 road intersections in the city the point-duty policemen are now floodlit by two 1,500-watt projectors. These installations are by Lyfa Ltd.

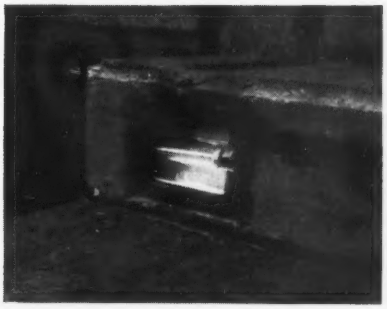
Concrete floodlighting towers in the port of Civitavecchia, Italy. (Civardi.)



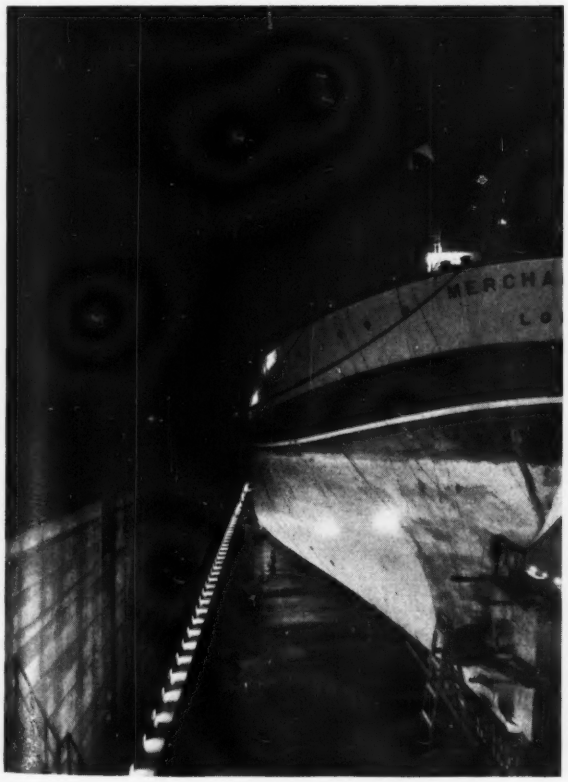
View of part of the port at Leghorn. (C.G.E., Milan.)

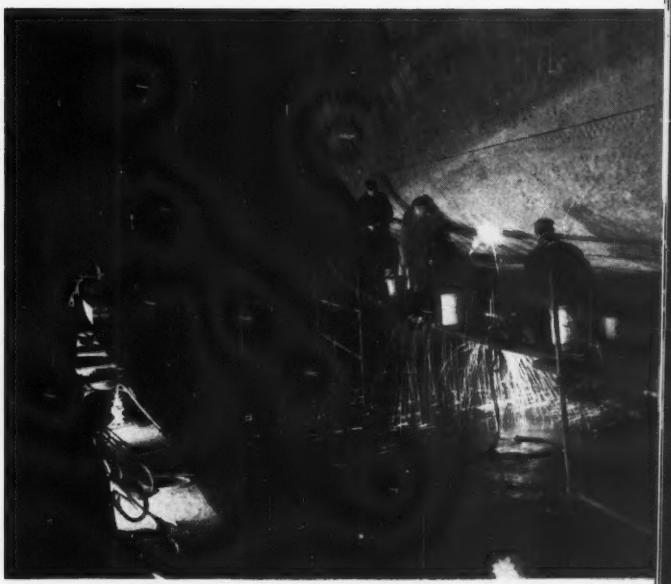


The new railway station at Heidelberg. The line drawing shows the distribution of illumination across the platform given by specially designed luminaires. (Siemens-Schuckert.)



Sodium lighting in a dry dock at Antwerp. (Philips, Brussels.)



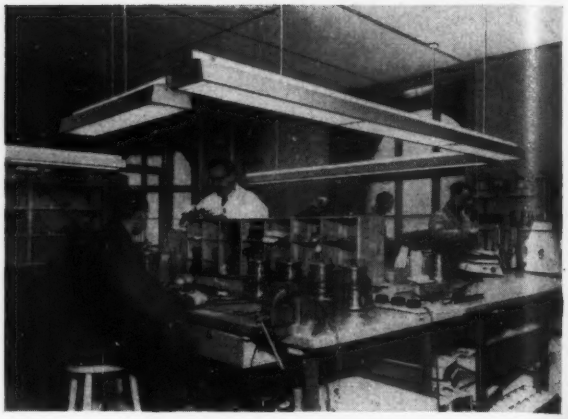


Industrial Lighting

In a review of this kind it is not possible to go into all the variations of industrial lighting. In some industries lighting practice is fairly well established; in others there is a lot of work for the lighting engineer to do. The position is well expressed by our correspondent in Yugoslavia who says "the average standard of lighting in factories erected since the war is fair; the same cannot be said for older factories." In other words much that has been done since the war is good, some of it is not so good, and there are many industrial users who have yet to be taught the benefits of better lighting.

In general it might be said that fluorescent lighting is making good progress; installations of blended lighting with mercury and tungsten lamps are increasing and the colour-corrected mercury lamp is also being used with success where conditions are similar.

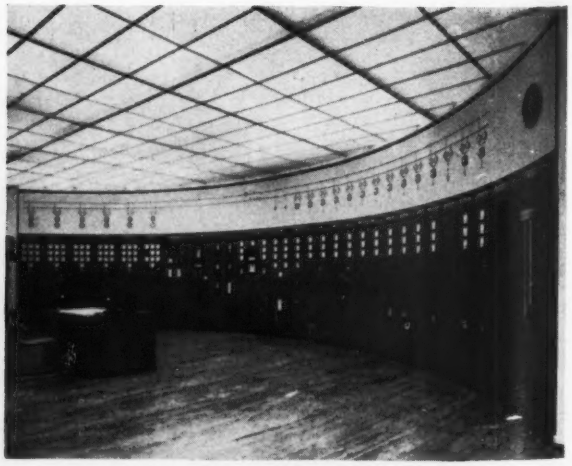
The lighting of locomotive sheds is a particular application which might be mentioned as it is receiving attention in many countries. It is reported that the New Zealand Railways have standardised on 250-watt H.P.M.V. lamps in clear heat-resisting well glass fittings for general lighting. It is appreciated that this does not provide an ideal solution but the problem is urgent and though electric and diesel locomotives will, no doubt, replace steam locomotives in time the latter are likely to be in use for a good many years.



An example from Sweden of local and general lighting for fine work provided by the same luminaires.

Example from Germany of local lighting for the examination of paper. (Siemens-Schuckert.)

An installation of 8 ft. fluorescent lamps in the United States. (The Wakefield Company.)



A luminous ceiling in the control room of a power station in Norway. (Saugbrugsforeningen, Halden.)

A new aircraft hangar for T.E.A.L. at Auckland, New Zealand, using twin 5 ft. 80-watt fluorescent lamps and 1,000-watt high bay tungsten units.

Typesetting by hand in Finland. Each of the pair of luminaires over each bench houses two 40-watt fluorescent lamps screened by opal "Perspex" giving even reflection from the face of the type.

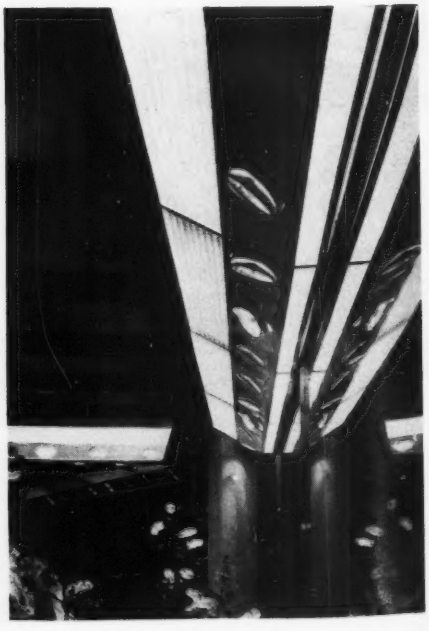
A textile factory at Roulers, Belgium, using 65-watt 5 ft. 4,200 deg. K fluorescent lamps giving an illumination of 50/65 lm/ft². (Philips, Brussels.)

Luminous ceiling technique applied in the Carlsberg Brewery, Denmark. 4 ft. fluorescent lamps in industrial reflectors are placed over a sand blasted glass ceiling. (Lyfa.)

Above, a motor car showroom in Brussels. (Philips, Brussels.)

Right, a motor car showroom in Bremen. (Zeiss Ikon.)

Shop window lighting unit in Sweden. (Axel Annell.)

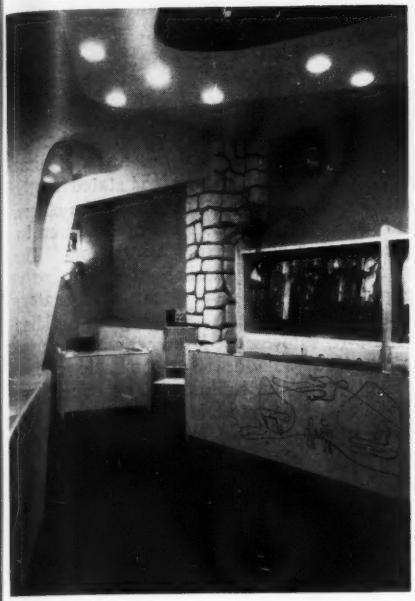


Shop Lighting

This is another subject best dealt with by a selection from the many photographs of installations which have been sent by contributors to this review. For the purpose of this review the term shop includes any place where things are sold from tea-shops to motor-car showrooms.

In general it might be said that the trend everywhere is to use fluorescent lamps to give background lighting with tungsten spot-lamps or decorative fittings to give high-lights, sparkle or effect. Frequently the tungsten lighting becomes dominant. In their attempts to introduce fluorescent lighting into Yugoslavia, lighting engineers in that country are beginning to experience the troubles that may arise from having too many "white" colour lamps; they are, however, taking the opportunity of persuading customers and contractors to consult experienced lighting engineers.

It would seem that much greater ingenuity is used and greater collaboration between architect, lighting engineer and client obtained in the lighting of small shops than in the case of large shops and stores. In the latter the use of flush square panels at regular intervals with occasional recessed spotlights is becoming almost monotonous.

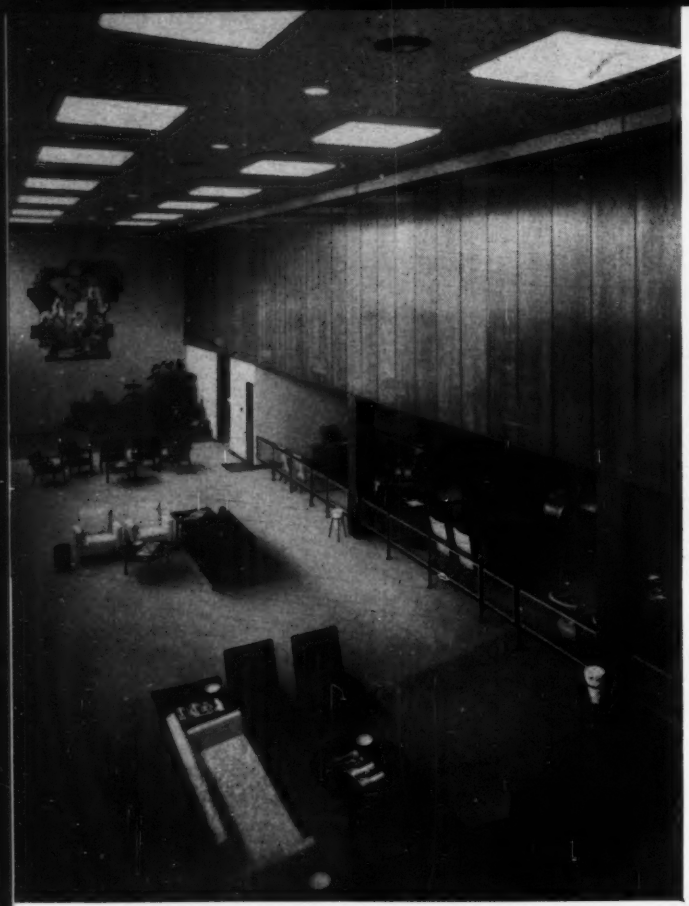


Above, children's clothing shop in Paris. (Philips, Paris.)

Top right, women's clothing shop in Buenos Aires.

Centre, cold cathode lighting in a shop in Marseilles. (Claude, Paz et Silva.)

Right, restaurant in Auckland, New Zealand. The centre ceiling panel provides air-conditioning and also screens cold cathode tubing.



Lobby of a bank at Dallas, Texas, lighted by recessed fluorescent and tungsten units. (The Wakefield Company.)

Office Lighting

Half of the installations submitted were in banks. It makes one wonder whether "overdraft" has no equivalent in other languages. In the United States it is stated that it is not unusual to find the factory lighted as well as the offices. In Britain minimum standards for factories are covered by legislation; the office worker has no such protection. The offices shown here are undoubtedly well lighted.

An interesting point about a new research laboratory building in the United States is that in designing the building the dimension of the 5-ft. fluorescent lamp which was used as the standard light source was adopted as the basic module for the construction of the entire building. The concept of designing a building around the module of the light source is certainly a step forward in the United States in the recognition of the importance of lighting in building design.

It is also stated from the United States that during recent years closer co-operation has of necessity been achieved between ceiling manufacturers and luminaire manufacturers in order to simplify the installation of both ceiling materials and recessed lighting equipment.

Main hall of a bank at Bologna lighted by continuous cold cathode tubing behind "Perspex" diffusers. (C.E.I.E.T. Milan.)

Plastic panel ceiling in the general office of the Oslo gas and electricity supply organisation. The average illumination is 40 lm/ft². (Philips, Oslo.)

Directional lighting from two rows of luminaires in an office in Berlin. Each luminaire houses three 40-watt fluorescent lamps. The average illumination is 50 lm/ft². (Zeiss Ikon.)

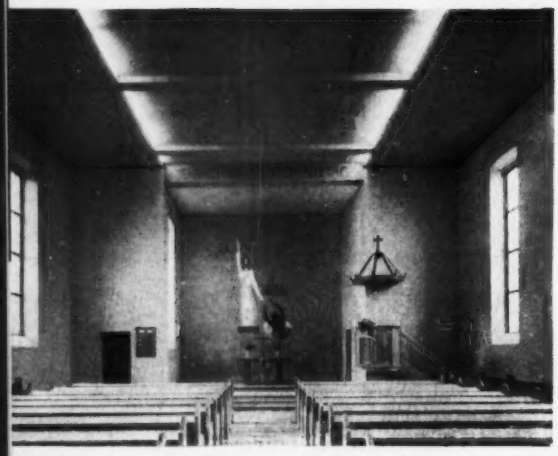
This office in Holland is provided with sky-lights to give adequate daylighting. Special fluorescent luminaires are built into the frames of the sky-lights. The average illumination is 54 lm/ft² increasing to 70 lm/ft² in the drawing office area. (Philips, Eindhoven.)

Church Lighting

It is interesting that of examples of new church lighting installations submitted half were of tungsten lighting and half fluorescent. As the next issue of *Light and Lighting* will be devoted to the lighting of churches no comment is offered here.

The church of St. James at Lower Hutt, New Zealand, is of interest in as much that recesses to house fluorescent lighting were cast in the structure. Fluorescent lighting for the altar is hidden from the congregation. The cross on the reredos is made of opal "Perspex" and contains a single white cold cathode tube. There is also a complete surround of single tube white cold cathode tubing behind the drapes at the altar.

St. James's Church, Lower Hut, New Zealand.



Indirect fluorescent lighting in a church in Germany. (Schanzenbach.)

A new church at Botany, N.S.W., lighted by spun aluminium anodised copper tungsten luminaires. (W. A. Smith.)

Lighting of St. Paul's Church, Offenbach, by recessed tungsten units. (Zeiss Ikon.)

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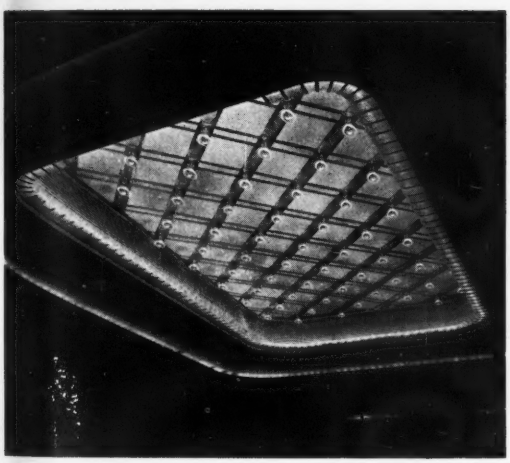
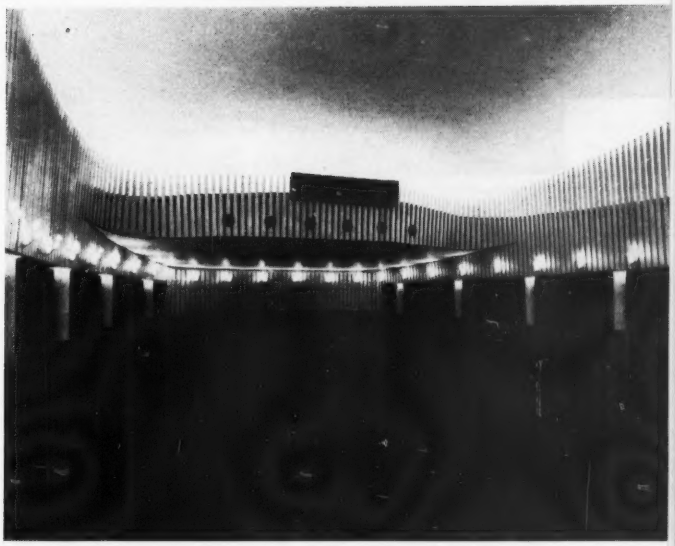
Places of Entertainment

The illustrations include a cinema, a concert hall, the Tivoli gardens and the ceiling of the assembly hall of a club.

A new installation has been put into the Forum, Copenhagen's exhibition hall. Running through the hall are two lengths of industrial vitreous enamelled reflector, each length housing 122 80-watt fluorescent lamps. These are serviced from a trolley running on rails above the fittings. A total of 1,150 80-watt "warm white de luxe" fluorescent lamps and 100 500-watt tungsten lamps are used. A picture of the Forum appeared in the December, 1955, issue of *Light and Lighting*.





Above, Orrefors crystal glass cove in the ceiling of the Danish Civil Engineers' Club, Copenhagen. (Lyfa.)

Top right, concert hall at Aarhus, Jutland. (Louis Poulsen.)

Centre right, Tivoli Gardens, Copenhagen. (Louis Poulsen.)

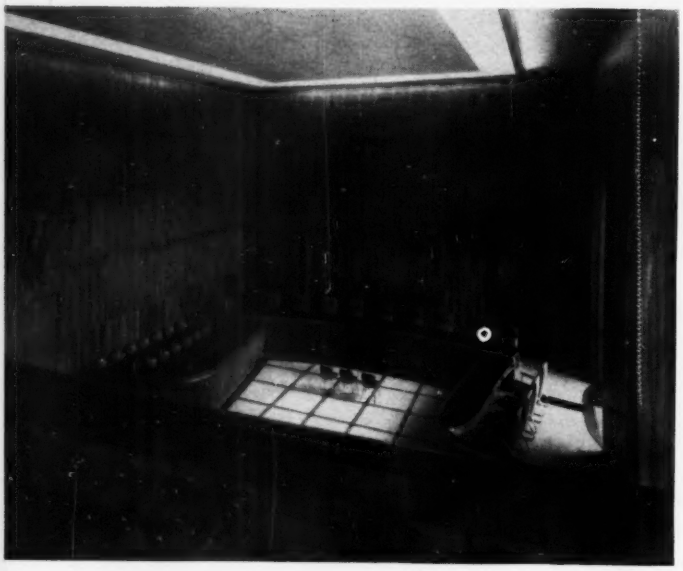
Right, cinema in Hanover. The main lighting is from 60-watt tungsten lamps mounted behind the wainscoting. (Zeiss Ikon.)

Miscellaneous

As populations increase so does the need for more schools, quite apart from the need to replace or modernise very many old school buildings. In the United States during 1955 60,000 new classrooms were built but there is still a shortage of 300,000 classrooms. All countries have this problem of providing teaching accommodation. The standard lighting in old schools needs improvement. (A survey of older schools in one country showed an average classroom illumination of between 1.2 and 1.5 lm/ft^2.)

Denmark, Finland, New Zealand and Sweden all show a preference for fluorescent lighting. Indeed now that better colour lamps are available a census of opinion amongst teachers in Stockholm showed that 90 per cent. of them preferred fluorescent lighting. Some school authorities still prefer tungsten lighting, and in Denmark a louvred fitting using a tungsten lamp in which the lower half is silvered has been used with success as it eliminates both direct and reflected glare.

The school authorities in New Zealand persist in the use of bare fluorescent lamps against the advice of the lighting people. An example from Finland shows how bare lamps might be used when screened by ceiling beams or baffles, but it is not clear whether the building was designed with this intention or whether the beams just happened to be in the right places.



Most countries now seem to be paying some attention to the long-neglected domestic field. In the United States, where the sales of domestic lighting equipment are increasing at a satisfactory rate, it is said that consumers are beginning to demand good lighting, and builders are finding it profitable to install proper lighting fixtures in all rooms. The cry for adequate wiring in houses in the United States is as loud as it is in Britain. From Sweden it is reported that the centre lighting point is at last giving way to flexible lighting, which can be altered as the use of the room is changed or the furniture is moved around. The "de luxe" colour fluorescent lamps are finding a use in kitchens often in combination with a tungsten lamp fitting over the kitchen table.

A special luminaire for hospital or hotel bedroom lighting has recently appeared on the Belgian market. Housing three 20 or 30-watt fluorescent lamps, it is fixed to the wall above the bed. Two lamps in the upper part give general lighting in the ward or room, whilst a single lower lamp, which can be operated independently, gives plenty of light on the bed without being at all objectionable either to the person in bed or anyone facing the bed.

The "Sound and Light" spectacles which originated in

Above, the Courts of Justice, Munich. (Philips, Munich.)

Top right, installation of bare lamps screened by deep beams in a school in Finland.

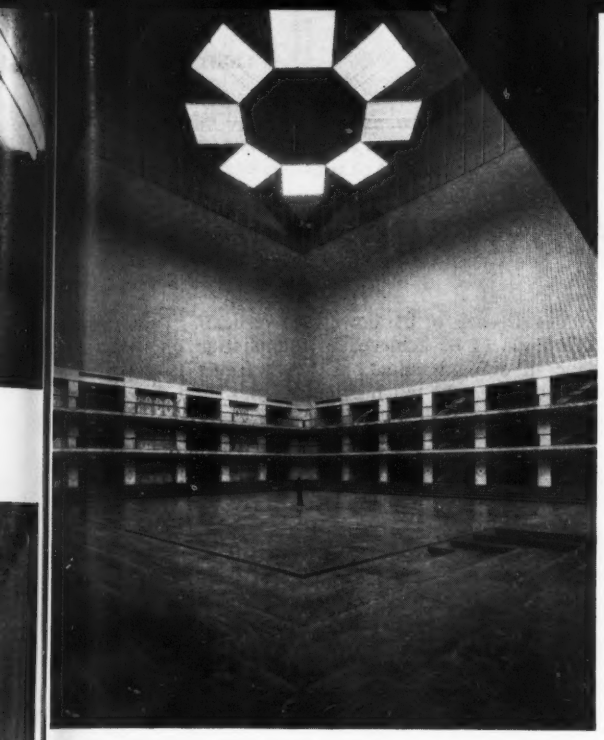
Centre right, kitchen of a Swedish house showing fluorescent lighting over the sink and a tungsten fitting over the table.

France have now spread to Belgium, where a pageant was recently organised at the House of Erasmus, in Brussels, by Etablissements A. de Backer.

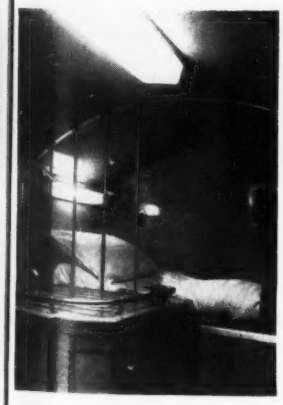
An illustration shows the Congress and Reception Hall of the E.U.R. building in Rome. The single central luminaire must surely be the biggest ever. It is equipped with 480 eight-ft. slimline lamps. The average illumination in the hall is 30 lm/ft^2.

Mention should be made of some of the difficulties experienced in the application of reflector spotlamps in Finland since production of these lamps in that country in 1954 made them so popular. Ignoring the advice given by the lamp makers and by lighting engineers many enthusiastic architects, contractors and users have used these lamps indiscriminately in recessed fittings without regard to ventilation and to the heat produced. This has lead the Electrical Inspectorate to issue strict constructional requirements for recessed fittings with a view to minimising fire risk. A paper on the subject prepared by the Electrical Inspectorate is to be presented at the C.E.E. meeting in Helsinki in May. The Finnish Lighting Society and the Finnish Architects Association have prepared a series of standard dimensions for ceiling openings for recessed filament and fluorescent fittings. In homes it is forbidden to recess any kind of lighting fitting in the kitchen, into cabinets or the like if the latter are made of wood.

Finally we are told that the Australian Code for Artificial Lighting in Building Interiors will probably make its appearance about the middle of 1956 and that it will be a great advance on any Code yet published.



Congress hall of the E.U.R. building in Rome which is lighted by 480 4 ft. slim line lamps. (C.E.I.E.T. Milan.)



Examples of fluorescent lighting in railway trains in France and Denmark. (Philips, Paris. Philips, Copenhagen.)

Acknowledgements

In concluding this review thanks are expressed to the following who have very kindly, and at much labour, supplied material for inclusion:—

R. Aspestrand (Norway), V. Benzio (Italy), Andre Boereboom (Belgium), Jean J. Chappat (France), Ivar Folcker (Sweden), J. J. Guttero (Argentina), N. E. Hammond (New Zealand), Bent Knudsen (Denmark), Stuart Lay (Australia), Juan Lillo (Spain), Boris Obermann (Yugoslavia), Esko Paivarinne (Finland), Ernst Rebske (Germany), Ruby Redford (United States), T. D. Wakefield (United States) and A. W. Gostt (several countries).

Lighting Abstracts

OPTICS AND PHOTOMETRY

535.24: 621.383.5

294. Photo-voltaic cell as a measuring instrument.

W. BERGER, *Litchttechnik*, **8,** 16-19 (*Jan.*, 1956). *In German.*

After describing the construction of the modern photo-voltaic cell the author lists the different quantities which are related with one another in the main part of the paper. These are open circuit voltage and operating voltage, short-circuit current and operating current, internal and external resistance, illumination, colour temperature of the light and its frequency, if cyclic, and the temperature of the cell. The internal resistance is defined arbitrarily as the open-circuit voltage divided by the short-circuit current. Curves are given to show the relation between the various quantities, in particular current, illumination and external resistance. The spectral distribution of the light is taken to be that of Standard Illuminant A. A new type of cell with a spectral sensitivity curve approximating to that of the eye and an absolute sensitivity not much less than that of the normal type of cell is now available. J. W. T. W.

LAMPS AND FITTINGS

295. Luminescent materials for mercury lamps. 6.21, 327.4

G. GUNTHER, *Ljuskultur*, **27,** 97-102 (*Oct.-Dec.*, 1955). *In Swedish.*

The improvement in the colour rendering of high-pressure mercury-vapour discharge lamps now possible with new luminescent materials represents a major step forward in lamp development. The change in the spectral emission of the mercury lamp which results from increase in the vapour pressure must be related to the excitation and emission characteristics of the available phosphors, and a suitable phosphor chosen whose temperature stability is also satisfactory under the operating conditions. The properties of a number of new phosphors are detailed, with diagrams. Magnesium fluor-germanate and magnesium arsenate are two satisfactory phosphors. Barium-strontium-lithium silicate, although easier to apply as a luminescent coating, has unsatisfactory temperature characteristics. R. G. H.

296. Some notes on searchlight projectors. 621.329

H. CARLEN, *Ljuskultur*, **27,** 94-96 (*Oct.-Dec.*, 1955). *In Swedish.*

The early history of optical projectors for lighthouses and military searchlights is traced, and recent developments summarised. The increased range of modern equipment with compact-source air-cooled and water-cooled mercury vapour discharge lamps has greatly expanded the uses to which such projectors can be put. R. G. H.

297. Fluorescent tubes with directed radiation. 621.327.43

Ljuskultur, **28,** 22-23 (*No.* 1, 1956). *In Swedish.*

Details are described of fluorescent tubes with a reflecting layer which directs light downwards within a sector of 120 deg. (± deg. of the downward vertical). Tables give the advantages to be achieved in illumination on the working plane in different situations. A warning is given of the need to screen the much brighter lamp from direct view, to avoid glare. R. G. H.

298. Xenon lamps. 621.327

Ljuskultur, **28,** 10-12 (*No.* 1, 1956). *In Swedish.*

The close correspondence between the spectral emission of the xenon discharge lamp and daylight is given as the reason for the more extensive use of such lamps in the textile and graphic industries and for the lighting of studios where colour film is exposed. The electrical characteristics of the xenon lamp are described. R. G. H.

LIGHTING

628.971.6

299. Effect of street lighting on the night-traffic accident rate.

F. D. WYATT *and* E. LOZANO, *Illum. Engng.*, **50,** 619-623 (*Dec.*, 1955).

A correlation between night-time accident rates and illumination levels for three stretches of road in Chicago shows that with 0.35 lm/ft² the rate is 6.43 fatal and non-fatal accidents per million vehicle miles, while with 1.3 lm/ft² it is 1.09 accidents Assuming that the night-time accident rate over the period of relighting would have increased in the same proportion as the daytime accident rate over the same period, the percentage of night-time accidents avoided by the relighting has been predicted. A calculation shows that the expense of relighting 205 miles of road to American I.E.S. standards is met by the saving in accident costs in a period of less than five years. P. P.

300. Lighting for indoor sports. 628.972

G. HASSEL, *Ljuskultur*, **27,** 81-86 (*Oct.-Dec.*, 1955). *In Swedish.*

A detailed summary, with diagram and photographs, of modern techniques is given, and basic principles are described. Lighting levels need not be so high for training and practice as for public competitions and tournaments. Great care must be taken to ensure that, in achieving the necessary levels and uniformity of illumination, lamps do not shine directly into the eyes of the players. This is particularly important in gymnastics, where competitors must look up (e.g., in rope climbing) for many activities. R. G. H

301. Lighting by louvred ceilings. 628.972

N. LINDGREN, *Ljuskultur*, **27,** 91-93 (*Oct.-Dec.*, 1955). *In Swedish.*

The use of egg-crate louvred ceilings illuminated from above by banks of fluorescent lamps is increasing. Two types are described, one with squares of 22 x 22 mm. and a cut-off angle of 45 deg., and the other 35 x 35 mm. with a 40-deg. cut-off. Methods of erecting the louvred elements are

suggested, and the light distribution which results is given. Lamps must not be spaced too far apart if an uneven brightness distribution on the ceiling is to be aovided. R. G. H.

302. Appreciation of colour and form. 612.843.6

S. HESSELGREN, *Ljuskultur*, **27,** 89-90 (*Oct.-Dec.*, 1955). *In Swedish.*

Experience of colour and form depends not only on the inherent properties of these elements of a scene, but also on the time for which they are needed and on their surroundings. A broken circle, for example, appears closed if seen for only a fraction of a second. A colour depends on its surroundings for the sensation it causes. Colour constancy is discussed briefly and reference made to a longer series of articles by the author in "Färg och Fernissa." R. G. H.

303. Recent trials of a glareless motor-car headlight. 628.971

E. EVERLING, *Lichttechnik*, **8,** 19-22 (*Jan.*, 1956). *In German.*

The headlight produces a narrow-angle beam with an unsymmetrical distribution, the intensity being much reduced on the offside so as to prevent excessive glare. It is stated that when two cars equipped with such headlights meet on the road, the range of visibility is much greater than when the cars are equipped with ordinary headlights giving a "passing beam" distribution. The precise results reported for the road tests contrast noticeably with the complete absence of details of the light distribution. J. W. T. W.

628.972

304. Lighting installations in the sports hall at Halmstad.

E. CARLSSON, *Ljuskultur*, **28,** 3-6 (Nr. 1, 1956). *In Swedish.*

The main installation in the sports hall at Halmstad is of 40-watt white fluorescent lamps, arranged in banks of six lamps on three phases, each pair inductance-capacity coupled. Flicker has thus been entirely eliminated. The construction of the roof is such that the groups of lamps can be recessed to avoid glare. A separately-wired reserve installation is provided. Special games are provided with individual lighting. The boxing area is served by recessed lighting from 16 aluminium reflectors with 1,000-watt filament lamps. Photographs show the lighting arrangements effectively. R. G. H.

628.972

305. Plastic ceilings—an interesting lighting system.

Ljuskultur, **28,** 13-14 (No. 1, 1956). *In Swedish.*

Luminous plastic ceilings are an American development. The installation in the Manufacturers Trust Company Building in New York is described and illustrated. Of special interest is the device used for washing the plastic material. R. G. H.

628.971.6

306. Some tendencies in street lighting development.

H. MOLIN, *Ljuskultur*, **28,** 15-17 (No. 1, 1956). *In Danish.*

Recent developments especially in fluorescent street lighting are described with illustrations. The importance of luminance relationships as well as illumination levels is stressed. Reference is made to information from various European countries, including new lamps with cylindrical electrodes from England, which are claimed to have specially long life but lower efficiency. R. G. H.

307. Hotel lighting. 628.972

B. ERISBORG and H. HOLMER, *Ljuskltur*, **28,** 18-21 (No. 1, 1956). *In Swedish.*

A new hotel in Värnamo is provided with "every technical finesse." The lighting is illustrated with photographs and diagrammatic details of the fittings used. The variety of fittings design is noteworthy. In the restaurant ceiling-inset, ceiling-suspended, and table standards are used. Ultra-violet lamps for fluorescent effects are employed over the dance floor. General fluorescent, and local filament lighting is provided in the guest rooms. Corridor lighting is by means of fluorescent tubes inset into the upper parts of the walls. R. G. H.

308. Stockholm Central Station is transformed. 628.97

Ljuskultur, **28,** 21-22 (No. 1, 1956). *In Swedish.*

The greater part of Stockholm Central Station has been rebuilt or renovated, and modern lighting installed. A standard type of fluorescent fitting has been adopted, of totally-enclosed type of opal plastic and anti-corrosion treated sheet metal. Each fitting includes three 40-watt lamps coupled on three phases. The lighting is free from glare or flicker, and maintained levels of 5 lm/ft² on the platforms and 18-24 lm/ft² in the cross-over tunnels have been achieved. R. G. H.

621.32:535.21

309. Fading of coloured objects by daylight, tungsten lighting and fluorescent lighting.

J. J. BALDER, *Lichttechnik*, **8,** 57-61 (*February*, 1956). *In German*, and *Lux*, **23,** 102-107 (*December*, 1955). *In French*

Eighty coloured specimens of oil paints, water paints (sprayed and brushed), textile threads and cloths were exposed to daylight through window glass and to the light from tungsten, fluorescent "warm white de luxe" and fluorescent "white de luxe" lamps, the total exposure given being 800,000 lumen hours/ft². The degree of fading was assessed by a number of observers as from 0 to 6, the last being described as "very severe fading." The results are shown graphically and it is concluded that fading is almost always greatest by daylight; next, but well below it, comes white de luxe followed closely by tungsten and warm white de luxe in that order. J. W. T. W.

628.972

310. Electric lighting of the rolling stock of the Swiss Federal Railways.

P. DIEFENHARDT, *Bull. Assoc. Suisse Elect.*, **47,** 77-79 (*February* 4, 1956). *In French.*

When the electric lighting of carriages was first introduced on the Swiss railway the supply was from two 18-volt batteries in series. Now 36-volt dynamos, rated at 2.2 kW are employed in conjunction with lead acid accumulators. One battery supplies the 860 watts required for lighting one coach, as well as the 550 watts needed for air-conditioning and other services. The illumination provided in the compartments of international trains is about 8 lm/ft². Some trials have recently been made with fluorescent lighting, a commutator being used to convert the D.C. to A.C. at 150 cycles. It is estimated that the cost of installation is twice that of filament lighting and the maintenance three times as dear. J. W. T. W.

Electrical Engineers Exhibition

Lighting exhibits at the fifth Electrical Engineers Exhibition organised by the Association of Supervising Electrical Engineers held at Earls Court, London, from March 20 to 24, 1956.

Just on 52,000 visitors, including nearly 500 from 55 countries overseas, attended the Fifth Electrical Engineers Exhibition held recently at Earls Court. With 310 exhibitors it was the largest electrical exhibition ever staged in this country. The following is a brief summary of lighting equipment exhibited.

BETA MANUFACTURING CO. showed their range of display fittings for use in hotels, stores and cinemas. Featured was the new contemporary "Tulip" range of ceiling fittings, pendants and wall brackets.

A comprehensive range of exhibits demonstrating the wide activities of DORMAN AND SMITH LTD. in the field of electrical engineering included controlled distribution lighting fittings, flameproof and bulkhead fittings, together with a range of "Loadmaster" circuit brakers and distribution boards.

The stand of the ENGINEERING AND LIGHTING EQUIPMENT CO. LTD. was concerned mainly with electrical equipment from miniature terminal units to the largest control panels, as well as die casting and bakelite moulding. The stand was lit by three of their new type "Perspex" industrial lighting fittings.

HERMAN SMITH SMITHLITE LTD. displayed a wide range of tungsten and fluorescent lighting fittings, but of special interest was the new range of "Smithlite" fluorescent fittings for industrial, commercial and domestic use, which dispenses with the standard bi-pin and bayonet cap lamp ends. The normal wires which go to the lamp ends have been extended and sealed, by means of "Araldite" to the outside of the tube and completed by attachment to the four-pin plug.

SIEMENS BROTHERS AND CO. LTD. presented several new lighting fittings, including the "Congress," for both domestic and commercial use. Amongst their street lighting equipment were the "Kuwait" and "Coventry" lanterns. All types of lamps, tungsten, fluorescent, discharge, projector, etc., were displayed.

A wide selection of lighting fittings for domestic, industrial and commercial use were shown by EKCO-ENSIGN ELECTRIC LTD. They included a full range of fluorescent lamps in all their shades and colours, together with tungsten, mercury and sodium lamps. The new "Softlight" pink tinted tungsten lamps were featured.

THE COURTNEY, POPE (ELECTRICAL) LTD. stand was of a two-floor design, the upper floor being utilised for the display of fittings at the ends, and a coffee bar in the centre. A demonstration window was installed incorporating several new fittings for the lighting of windows, and realistically dressed with merchandise. The "Controlite" reflectors which were introduced last year with various coloured reflecting surfaces, were this year supplemented with a model for the 100-watt lamp. A fitting which created much interest was the new "Global Spotlight" which is now being produced for the 75-watt internally silvered lamp. For the first time a corrugated luminous ceiling manufactured in "Perspex" was shown and this created quite a lot of interest due to its high efficiency and good maintenance qualities.

FALK, STADELMANN AND CO., LTD., exhibited a selection from their comprehensive range of contemporary lighting fittings, including the "Perseus" 8-light pendant of brass construction, finished in polished brass with stove enamelled off-white tubes and supported by heavy circular P.V.C. covered flex with satin opal lipless glassware.

Prominent among the industrial fittings on view was the "Grenville" heavy duty vapour-proof industrial fitting for use with tungsten lamps, constructed of cast aluminium alloy, specially finished.

The items shown in the lighting range of the BRITISH CENTRAL ELECTRICAL CO., LTD., included the "Infini-Angle" lighting unit for industrial use, complete with a range of accessories to enable these units to be fitted to machine tools, work benches and drawing office equipment. An interesting display was made on the complete range of "Briticent" gripper handlamps. A further feature included a range of fluorescent handlamps including an 8-watt single lamp with automatic starter, twin 6- and 8-watt fluorescent handlamps and an 8-watt barrel inspection lamp.

The LOBLITE LTD. stand displayed a comprehensive range of lighting fittings and electrical accessories. The firm's watertight and all-insulated industrial and farm wiring system comprises a complete range of non-corrosive fittings and accessories for surface wiring in cable or conduit. It includes lighting fittings for ceiling and wall mounting, bulkhead fittings, junction boxes, switches, cleats, etc. The newly developed range of prismatic bulkhead fittings in plastic and metal was shown.

THE BENJAMIN ELECTRIC LTD. showed a complete range of tungsten, mercury and fluorescent lighting fittings for indoor and outdoor use, the majority finished in "Crysteel" vitreous enamel. Of outstanding interest was an entirely new lighting unit, the prototype of which was displayed for the first time. This was the Teelon unit and canopy housing fluorescent lamps which illuminate the underside and the surrounding area underneath. Designed primarily for petrol pump islands and similar locations, the unit sections can be joined to make up any length and the apertures underneath can be fitted with dust and vapour excluding covers. Examples of floodlights, "Flurolier" fluorescent fittings and the "Mushroom" street lighting fitting were also displayed.

The accent of CROMPTON PARKINSON LTD.'s display was placed on the part played by the company in the manufacture of industrial electrification equipment.

Examples of the "New-Range" commercial and industrial fluorescent lighting fittings now available in 150 different styles for 2-, 3-, 4- and 5-ft. lamps were displayed together with a representative selection of lamps, including the latest mercury vapour discharge lamp.

Commercial tungsten and fluorescent lighting fittings for use in offices, schools and hospitals formed the main feature of the S.L.R. ELECTRIC LTD. stand.

TROUGHTON AND YOUNG LTD. showed new models of lighting fittings for commercial and display lighting.

SIMPLEX ELECTRIC CO. LTD. showed their "Screwglass" and "Wellglass" lighting fittings. Amongst their new products were a new dispersive reflector range and a new corrosion resistant fluorescent fitting.

G.B.M. (ELECTRICAL), BIRMINGHAM, displayed amongst their electrical equipment three decorative lighting fittings.

BRITISH ELECTRIC LAMPS LTD., who specialise in decora-

tive lamps, presented their complete range of candle lamps with ratings from 25 to 60 watts.

R. AND A. G. CROSSLAND LTD. displayed industrial and commercial lighting reflectors together with fluorescent fittings and reflectors.

LONGLAMPS LTD. displayed a wide variety of architectural and fluorescent lamps, fittings and components together with neon and cold cathode tubes and components.

A new spotlight accessory was introduced on the LUMITRON LTD. stand incorporating a polished anodised super-pure aluminium reflector in red, blue, green or amber.

A standard range of lighting shades, ceiling roses and fittings was seen on the VOLEX ELECTRICAL PRODUCTS LTD. stand.

Many new items of interest were displayed by WALSALL CONDUITS LTD., including several flameproof items, underfloor ducting and trunking and a complete range of industrial lighting fittings.

J. A. CRABTREE & CO., LTD., presented a selection of electrical wiring accessories, amongst which was a wide variety of shockproof "Lincoln" and "Standard" flush and surface mounting tumbler switches and "Lincoln" ceiling switches.

PHILIPS ELECTRICAL, LTD., featured a full range of commercial and industrial fittings for use with the "Gearless" fluorescent lighting system. This system dispenses with all the normal control gear and employs only a tungsten ballast lamp—itself a useful light source—to control the fluorescent lamp. The standard range of fluorescent fittings, floodlights, specialised fittings and applications of interest to supervising engineers, included a new range of display fittings.

HOLOPHANE, LTD., exhibited a comprehensive range of prismatic lighting fittings with a diversity of controlled light distributions for applications in industry, commerce and public lighting. Industrial fittings included a new general purpose translucent range for medium interior mounting heights, in addition to well-established fittings for high and low bays with covered and translucent units, blended fittings and a heavy duty 1,000-watt mercury discharge unit. Cast aluminium fittings were also on display with bulkhead, flame-proof, vapour-proof and enclosed industrial pendants for specialised industrial applications. Commercial fittings included the new enclosed translucent unit for 300-500-watt tungsten lamps, of particular interest to those responsible for lighting in churches, public halls, and school assembly halls. Public lighting services were catered for in the range of floodlights (interior and exterior applications) for railway yards, docks and sports grounds.

Examples from their range of lighting fittings were the main feature of the stand of VICTOR PRODUCTS (WALLSEND), LTD.

OLDHAM & SON, LTD., exhibited a complete range of portable power and lighting equipment. A new development was the introduction of a low voltage A.C./D.C. supply unit which provides a convenient, safe and economic supply for experimental work in schools. Also exhibited were several units representative of a wide range of emergency lighting equipment for use in hospitals, cinemas, and other public buildings, and for industrial application.

THE EVERETT, EDGCUMBE & CO., LTD., exhibit included examples of the most recent developments in electrical indicating and graphic or recording instruments, covering nearly every type and size for both A.C. and D.C. measurements.

THE HARRIS & SHELDON (ELECTRICAL) LTD. stand provided a comprehensive cross-section of modern lighting practice as applied in industry, offices, public buildings, shops and stores. New introductions included decorative fittings of interesting design in "Perspex" and glass. Also featured was the "Luve-Tile" white plastic illuminated ceiling system.

SANGAMO WESTON LTD. displayed a range of meters and instruments, including photo-electric cells, photographic exposure meters and millivolt amplifiers.

THE LINOLITE LTD. display included the standard "Linolite" range of decorative fittings and reflectors, employing filament tubular lamps for domestic, commercial and industrial reflectors for shopwindow and display lighting, and the "Spotline" adjustable fluorescent bench and drawing-board light. New exhibits included the type "SPL" picture lighting unit, which is very small in section, and a very small outercase fluorescent reflector with an opening of 1.7/8 in., which is available for use with the 1-in. diameter 18 ins., 3 ft. and 5 ft. 50-watt lamps.

The main feature displayed by the MAJOR EQUIPMENT CO., LTD., was their "Multi" fluorescent fittings, which employ a basic batten unit that can be built up with standard reflectors and diffusers into fittings suitable for either industrial or commercial use. Another product was a new choke board, which is extremely compact and portable and has a special application for use where space is limited, and which enables lighting circuits to be dimmed by remote control from any convenient position in the theatre.

NETTLE ACCESSORIES LTD. showed a large selection of their moulded electrical accessories, including E.S. and B.C. batten holders and lampholders, inspection handlamps, cable couplers and rubberclad sockets and plugs in weatherproof and watertight patterns.

The fittings of most recent design and general interest shown on the VERITYS LTD. stand were the new "Maxlume" quick-lock reflectors, the "Stayclean" overlamp reflector and the new "Permaseal" dust-proof reflector.

THE MERCHANT ADVENTURERS' stand displayed almost wholly the successful "Ventura" series which was first marketed in 1955 and is already exported in large quantities to the Commonwealth and to many countries in Central Europe.

Among prominent features of the comprehensive range of products which THE GENERAL ELECTRIC CO., LTD., showed was the new system for lighting shop windows, developed by the G.E.C. Research Laboratories. It made use of the recently introduced 125-watt colour corrected mercury vapour lamp, in conjunction with 200-watt tungsten lamps. The two types of lamps are mounted alternately in standard Gecoray reflectors. Another application of lighting for selling was the G.E.C. electronic dimming apparatus. Also shown was a selection of Osram lamps for all purposes and fittings for domestic and exterior lighting.

A wide variety of Mazda lamps and lighting equipment for commercial and industrial use, including a representation of the Mazda "selected" range were shown on the BRITISH THOMSON-HOUSTON CO., LTD., stand. One of the most interesting exhibits was the "New Monolux" fluorescent batten fitting, intended for both commercial and domestic use, ready wired with B.T.H. control gear and cartoned complete with a Mazda "New Warm White" 80-watt lamp. The display also included lighting trunking systems, floodlighting fittings, recessed "Module" fittings and a range of lamps.

A comprehensive display of all types of industrial and commercial lighting fittings was shown by ROWLANDS ELECTRICAL ACCESSORIES, LTD., including an extensive range of R.E.A.L. floodlanterns for use with tungsten, mercury and sodium vapour lamps.

Included amongst the many exhibits by F. W. THORPE, LTD., were fluorescent, tungsten and mercury industrial and commercial lighting fittings finished in vitreous enamel. Also

(*Continued on page* 140)


We
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shape it
to suit
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Light fittings made of 'Perspex,' U.P.V.C. and 'Darvic' in whatever form, shape or size you want—delivered to you on time. We offer a complete service in shaping and fabricating these materials. We do a first-rate job of it. And we do it promptly. We could probably be a great help to you—write to us or telephone
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I.E.S. ACTIVITIES

Sustaining Membership

On page 135 *is given a list of companies and organisations who appreciating the work of the I.E.S. support the Society as Sustaining Members. The I.E.S. rightly feels that its work during the* 47 *years of its existence has had a profound influence upon the development and acceptance of better lighting in all spheres of activity to the benefit of the community as a whole and of direct benefit to the lighting industry. The Society deserves the support of all organisations that produce or have an interest in the use of lighting equipment; as Sustaining Members such organisations not only help the Society but also help themselves.*

London

At the sessional meeting held in London on March 13 a paper entitled "Light sources for colour matching" was presented by Messrs. E. E. Miles and D. C. Peach.

They opened the lecture by mentioning that the problem of colour matching could be considered from two aspects, firstly the day-to-day control of colour during the manufacture of an article, such as paint, when the same basic ingredients are used; secondly, the problem of matching articles which are produced from different basic materials or colouring ingredients, where the spectral reflection characteristics are not identical.

A match of the first type, made under one form of lighting, remains a true match under other types of lighting. This is not necessarily so for a match of the second type, and the colourist has to satisfy himself that the match will be maintained under the widest possible range of user conditions. He can easily check his match under indoor lighting where, for example, tungsten lamps are used, but the checking under all conditions of daylight is not so easy, because of its wide variation. These variations arise from the altitude of the sun and the amount of cloud or haze present. The equivalent colour temperature of daylight can vary from 3,500 deg. K to 26,000 deg. K. Through years of practice, colourists in this country have come to consider that if a match is obtained when the samples are exposed to a lightly overcast north sky, at a colour temperature of 6,500 deg. K, then the match will be reasonably well maintained under all other conditions of daylight.

To enable work to be carried on during darkness and in unfavourable daylight conditions, an artificial daylight source is desirable which closely reproduces the preferred daylight conditions, both in spectral composition and in the large diffuse nature of skylight. With the growing use of pigments and dyes having a fluorescent component, any artificial daylight source must also reproduce the ultra-violet characteristics of daylight.

There are also variations between observers in agreeing as to the closeness of a match, mainly due to macular pigmentation in the eye. Selection of observers can reduce this variation and a possible artificial daylight source which can be varied to compensate for these differences between observers is discussed later.

The light from a carbon dioxide discharge tube comprises closely spaced lines and bands over the whole spectrum and the resultant colour resembles that of an overcast sky at 6,500 deg. K. These tubes, which have a low brightness and can be installed to cover a ceiling to give a large diffuse source, were used before the war, but the maintenance and attendant heat radiation were considerable, and with the development of highly efficient and less costly sources, the carbon dioxide tube has become obsolescent.

A high-pressure xenon compact lamp has recently been suggested as a colour-matching source. While the colour is satisfactory, the elaborate control gear, high cost of the lamp and the relatively low overall efficiency apply severe limitations to its use.

For simplicity and ease of operation, a high-voltage tungsten lamp with a suitable glass filter has many advantages. The ultra-violet output of this combination enables the matching of colours with fluorescent components to be carried out, but the heat radiation, particularly when several units have to be used to give a sufficiently large source area, is a serious disadvantage.

The development of the fluorescent lamp, with its ability to produce cold colours at a high efficiency, appeared to be the answer to the problem of a source for colour matching. For routine colour control, the fluorescent lamp has proved very satisfactory, but the colour distortion due to the radiation from the blue mercury lines has limited its use in critical work. Because the source is deficient in near ultra-violet radiation, it is not suitable for use with colours containing a fluorescent constituent.

A combination of tungsten filament lamps and blue fluorescent lamps gives a marked improvement for critical work, and with the addition of an ultra-violet-emitting tube, the deficiency in this region can be corrected. With the necessary control of the relative basic output of the tungsten and fluorescent lamps, the resultant colour can be varied to compensate for the observer variations, and it is felt that units of this type will become increasingly important for critical work.

Birmingham Centre

The January meeting of the Birmingham Centre was devoted to the reading of papers by members of the Centre under the heading of "My Most Interesting Lighting Problem."

The first speaker, Mr. H. F. Truman, spoke on the lighting of Walsall Arboretum. The talk, illustrated by many coloured slides, dealt with the treatment, by coloured floodlights, of woodland scenes, fountains, pools and waterfalls. The effects as seen on the screen, which could but poorly portray the true brilliance of the real thing, were a credit to Mr. Truman and all who assisted in the preparation of the illuminations.

Mr. Willdey dealt with the problems attendant on the lighting of a large motor-car showroom converted from a warehouse and lock-up shops into a fine island showroom with windows on three sides. The ceiling was a mass of irregularly placed beams with vertical columns which could not be removed. Early planning in conjunction with the architect, however, produced the answers. A false ceiling to cover the beams, a suspended soffit to "tie-up" the vertical columns, built-in provision for window lighting, all contributed towards an excellent scheme. Lighting was provided by a combination of hot and cold cathode lamps.

The next paper was prepared by Dr. E. H. Norgrove who, due to illness, was unable to be present; the paper was read by Mr. Hanson, chairman of the Centre. The subject was the lighting of a foundry. Dr. Norgrove's approach to the problem was that of the man who is paying the bill and intends to leave no stone unturned in his efforts to obtain value, coupled with the best lighting for the job. Consultation with the people working in the foundry, examination of the economics of the scheme, installation of different types of lighting in test sections of the building finally produced an answer which satisfied all parties concerned.

This was followed by a paper by Mr. K. F. Haylor on the lighting of an insurance office, in which the conversion of a dreary building into well-lit modern office accommodation was described.

The last paper of the evening was presented by Mr. W. G. Whitaker and dealt with the flooding of Chatsworth House and Gardens. The beauty of this fine old house and gardens with its lakes, waterfalls and fountains was well illustrated by slides.

The five speakers then dealt with questions from the audience and the vote of thanks which followed proved without a shadow of doubt that this had been the most popular sessional meeting for many months.

The annual general meeting of the Birmingham Centre took place on February 24. After the formal business of the evening had been concluded, the chairman introduced Mr. A. G. Penny, a Vice-President of the Society, who gave an address.

Mr. Penny had chosen as a title for his address simply

Members and guests at the annual dinner and dance of the Swansea Group, held on February 3, including the Mayor of Swansea and the president.

"Looking Ahead." He first briefly surveyed the past 47 years of the Society's activities, a past of which any society could well be proud. Launched by two or three far-seeing men who even then appreciated that with the advent of economic artificial light sources the day would come when adequate lighting would be available to all and that the next natural stage of development would be an abundance of light with all its attendant problems of distribution, brightness, fittings, design, etc.

In the immediate post-war years a large amount of relighting took place, not only in industry, but also commercial establishments, including offices, stores, etc. The main aim, however, had been functional efficiency; little time and money was spent in planning lighting which also satisfied man's aesthetic senses. Light for its own sake, divorced from colour and form, was the order of the day. Fortunately this era was passing and some now appreciated that good lighting coupled with pleasant surroundings not only contributed greatly to man's sense of well-being, but in this atmosphere work ceased to be a burden, man could carry out much more efficiently his daily task in a place of work which was not only bright, but also cheerful, accident rates dropped, output went up, the shops and stores became inviting places in which to spend not only money, but a pleasant hour. The lighting engineer was no longer an engineer, he was developing into an artist in his own right.

Street lighting was considered not only from the type of lamp used, but with particular reference to the prevailing custom of erecting columns which bore no relationship whatever to surrounding architecture, plain and unadorned concrete creations rose high into the air dwarfing modern houses or defacing the view of some of our finest classical-style buildings. Light sources destroyed every attempt at colourful exteriors.

Lighting in the home was also dealt with, it being pointed out that the meagre sum usually allowed for this purpose being infinitesimal when compared with the money spent on the purchase of a house and its furnishings. A great unexplored field was open to the lighting expert and Mr. Penny suggested that members of the Society would do well to view their own homes and effect improvement as the best means of educating their neighbours and thus the general public.

Nottingham Centre

The Nottingham Centre were unfortunate that their February Sessional Meeting could not be addressed by Miss H. M. Maurice, who was to give them her paper on "The History of Mine Lamps." Due to weather conditions she was unable to be present. The Centre, however, was most fortunate in securing the services of Mr. L. H. Morris and Mr. J. M. Watson, of the Faculty of Mining, Nottingham University.

Mr. L. H. Morris dealt extensively with the history of mines lighting from the day of flint wheels to the advent of electric miners' lamps and dealt at length with the Davey invention, its merits and origin. Mr. J. M. Watson completed the history up to the present day explaining the increased lighting efficiencies obtained and how these advances have benefited the industry in general and the health and eyesight of miners in particular.

The discussion was opened by Mr. H. Payne, and a hearty vote of thanks was proposed by Mr. J. R. Just.

There was a very large attendance at the meeting held on March 1, when Mr. R. W. Unwin presented a paper on "Lighting for Photography." Mr. Unwin covered almost every facet of the subject and illustrated his remarks by a large number of coloured lantern slides. The discussion was opened by Inspector H. Parkin of the Nottingham Constabulary who congratulated the author on an excellent paper and after a considerable number of members and visitors had taken part in the discussion a formal vote of thanks to the author was moved by Mr. I. A. A. Macdonald.

Sheffield Centre

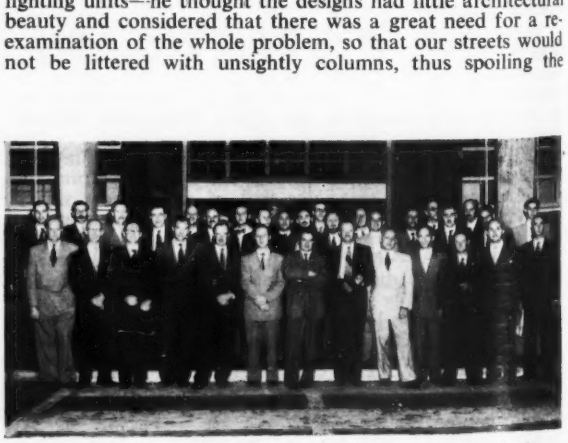
The February Sessional Meeting of the Sheffield Centre was held on Monday, February 13, when Mr. W. A. Varney, a member of the Centre, lectured on "Photometric and other Tests for Street Lighting." After a brief historical introduction the speaker described the work of the B.E.S.A. committee which produced the first standard for street lighting in 1927 and the work of subsequent committees leading up to the present codes of practice.

The lecturer then described a number of street-lighting lanterns which were on view, pointing out their features and criticising certain design aspects that he considered could be improved. The use of the integrating sphere for measurement of lamp efficiencies and the method of obtaining polar diagrams of lanterns was also outlined. In conclusion, the economics of lamp replacement was mentioned. An interesting discussion followed which was opened by Mr. W. G. Thomson. Mr. J. Gilbert wound up the meeting with a vote of thanks to Mr. Varney.

On Monday, March 12, the Sheffield Centre members were honoured by the visit of Mr. A. G. Penny, one of our Vice-Presidents, who gave them an addresss entitled "Preparing for the Future."

In his lecture the speaker endeavoured to anticipate likely progress in lighting by way of development of existing ideas. He thought there would be more use made of indirect lighting, both tungsten and fluorescent, by using contemporary furnishings for purposes of concealment, e.g., fluorescent lights built into pelmets, and generally choosing the lighting unit with a view to it blending into the decorative scheme.

Mr. Penny was sharply critical of contemporary street lighting units—he thought the designs had little architectural beauty and considered that there was a great need for a re-examination of the whole problem, so that our streets would not be littered with unsightly columns, thus spoiling the



A group of members of the Transvaal Centre during their visit to the Jan Smuts Airport.

SUSTAINING MEMBERS
of the
ILLUMINATING ENGINEERING SOCIETY

A.E.I. Lamp and Lighting Co.
J. Aikman and Co., Ltd.
Aladdin Lighting Ltd.
Allom Brothers Ltd.
Aurora Lamps Ltd.
Barlow and Young Ltd.
T. Beadle and Co., Ltd.
Benjamin Electric Ltd.
City of Birmingham Education Department.
Bolton Corporation Lighting Department.
British Electric Lamps Ltd.
British Electrical Development Association.
British General Electric Co. (Pty.) Ltd., Johannesburg.
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Cartwright, J. T. and Sons, Ltd.
Central Electricity Authority.
Chance Bros. and Co., Ltd.
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George Davidson and Co., Ltd.
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Edmundsons Electric Co., Ltd.
E.G.S. Company Ltd.
Ekco-Ensign Electric Ltd.
Electrical Components Ltd.
Electric Lamp Manufacturers Association.
Electric Street Lighting Apparatus Co., Ltd.
George Ellison Ltd.
Engineering and Lighting Equipment Co., Ltd.
Engineering Service Installations Ltd.
Evans Electroselenium Ltd.
The Ever Ready Co. (Great Britain) Ltd.
Falk, Stadelmann and Co., Ltd.
Falks Electrical Supplies (S.A.) (Pty.) Ltd., Johannesburg.
H. W. Field and Son Ltd.
Foster Electrical Supplies Ltd.
Fred Reynolds Ltd.
B. French Ltd.
Fulford Brown Bros. (1929) Ltd.
Gas Council.
General Electric Co., Ltd.
Girdlestone and Co., Ltd.
Donald Grant and Sons Ltd.
Hailwood and Ackroyd Ltd.
W. T. Hellaby and Co., Ltd.
Heyes and Co., Ltd.
S. H. Heywood and Co., Ltd.
Hirst, Ibbetson and Taylor Ltd.
Hivac Ltd.
Holland House Electrical Co., Ltd.
Holophane Ltd.
Humber Ltd.
Hume, Atkins and Co., Ltd.
Imperial Chemical Industries Ltd. (Metals Division).
Imperial Chemical Industries Ltd. (Paints Division).
Imperial Chemical Industries Ltd. (Plastics Division).
Inductive Appliances Ltd.
J. A. Jobling and Co., Ltd.
James Kilpatrick and Son Ltd.
Knightshades Ltd.
Linolite Ltd.
Littlewoods Pools, Central Maintenance Department.
Corporation of Liverpool.
The Lodge Fittings Co., Ltd.
London Electric Firm Ltd.
London Electricity Board.
Joseph Lucas Ltd.
Luxram Electric Ltd.
Marryat and Place Ltd.
Merseyside and North Wales Electricity Board.
Metallic Seamless Tube Co., Ltd.
Metropolitan-Vickers (S.A.) (Pty.) Ltd., Johannesburg.
Midland Electric Installation Co.
Midlands Electricity Board.
Morgan Crucible Co., Ltd.
Mortimer Gall and Co., Ltd.
Municipal Electricity Department, Singapore.
Neon Fluorescent (S.A.) Ltd., Johannesburg.
Nettle Accessories Ltd.
New Era Lighting Industries (Pty.) Ltd., Johannesburg.
Newey and Eyre Ltd.
North-Eastern Electricity Board.
North-Western Electricity Board.
Oldham Corporation Street Lighting Dept.
Oldham and Son Ltd.
Philips Electrical Ltd.
S. A. Philips (Pty.) Ltd., Johannesburg.
F. H. Pride Ltd.
Progress Electric Fitting Co. (Pty.) Ltd., Johannesburg.
Prudential Assurance Co., Ltd.
Albert E. Reed and Co., Ltd.
Revo Electric Co., Ltd.
John Riley and Son (Electrical) Ltd.
J. Rivlin Ltd.
Robinson, King and British Challenge Glazing Co., Ltd.
Rogers, G. S. (Pty.) Ltd., Johannesburg.
Rowe Bros. and Co., Ltd.
Rowlands Electrical Accessories Ltd.
Satchwell and Gittings Ltd.
James Scott and Co., Ltd.
Siemens Brothers British (Pty.) Ltd., Johannesburg.
Siemens Brothers and Co., Ltd.
Sign Components Ltd.
Simplex Electric Co.
Simplex Electric Co. (S.A.) Ltd., Transvaal.
S.M.D. Manufacturing Co. (Pty.) Ltd., Natal.
Herman Smith Smithlite Ltd.
Wm. Allan Smith and Co., Ltd.
W. H. Smith and Co. (Electrical Engineers) Ltd.
J. G. Sneath Ltd.
South Eastern Electricity Board.
Southern Electricity Board.
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South Wales Electricity Board.
South Western Electricity Board.
W. H. Stone and Co. (Cardiff) Ltd.
Strand Electric and Engineering Co., Ltd.
Strong Electric Corporation (Great Britain) Ltd.
Wm. Sugg and Co., Ltd.
Thermo-Plastics Ltd.
Thorn Electrical Industries Ltd.
Thorn Electrical Industries (S.A.) Pty., Ltd., Johannesburg.
F. W. Thorpe Ltd.
Troughton and Young Ltd.
Tucker and Edgar Ltd.
Verity's Ltd.
Walsall Conduits Ltd.
J. Walton (Electrical) Ltd.
Wardle Engineering Co., Ltd.
J. M. Webber and Co., Ltd.
Whitworth Electric Lamp Co., Ltd.
Wokingham Plastics Ltd.
A. J. Wright (Electrical) Ltd.
Yorkshire Electricity Board.
Z Electric Lamp and Supplies Co., Ltd.

street scene by day. The lecturer said it was not anticipated that there would be much further development in the efficiency of fluorescent lamps in the future. He urged lighting engineers to consider each scheme of lighting as a separate problem, with the units concealed wherever possible in the architectural surroundings rather than a straight problem of a required light intensity without regard to the shape, size, or position of the lighting units.

Several speakers joined in the discussion, one stating that he could not agree with Mr. Penny on his opinion of street lighting columns as he thought the designers had endeavoured to make the best of a difficult job.

Transvaal Centre

The 1956 Session of the Transvaal Centre opened on January 25, when 28 members and six visitors went to Jan Smuts Airport, Johannesburg, to inspect the lighting installations and electrical services.

After a meal at the Airport Restaurant the party inspected the Control Tower, the main substation and the stand-by automatic-starting diesel generating set.

In the Control Tower it was learned that all the lighting for the airfield is remotely controlled from a lighting "Console" comprising a series of lever-switches and an illuminated desk type mimic diagram which shows the various runways and interleading taxiways. The particular runway or taxiway being used is illuminated by indicating lamps. In the main substation a "Console" type control desk with an illuminated mimic diagram was used to indicate the condition of various important circuits.

The party then proceeded to the main runway when the operator in the Control Tower switched on the approach and runway lighting at various intensities. (Readers interested in further details of the lighting of the airfield are referred to the illustrated article which appeared in the October, 1955, issue of *Light and Lighting*.)

A tour of the aircraft hangers enabled the visitors to inspect aircraft of the South African Airways and to take note of the lighting of very large indoor areas.

The final visit was to the workshops which have been constructed for the maintenance and overhaul of aircraft of the South African Airways. The layout of the workshops and diversity of operations carried out was worthy of a visit for this purpose alone.

The very active assistance and able guides provided by the Civil Aviation Board was greatly appreciated. The fact that the last party did not leave the airport until 11.45 p.m. is proof of the interest taken in this visit by members of the Transvaal Centre.

Liverpool Centre

Speaking at the meeting of the Liverpool Centre on February 21, Mr. W. B. Parkinson examined the effect of the lighting load on system load as a whole and on the commercial activities of supply undertakings.

With the aid of slides and diagrams of system load curves he explained the important effect of the lighting load in contributing to system peaks and in shaping daily load curves at peak times. He showed how the lighting load, superimposed on other loads, determines the potential peak periods in winter. By a study of load curves from the commencement of public electricity supply to the present time, Mr. Parkinson sketched the changes in the characteristics of the lighting load and indicated how—owing to general development of the uses of electricity—the effect of the lighting component as a supply problem has become less serious over the years.

Considering the commercial effect of the lighting load, Mr. Parkinson explained how continued improvement in the efficiency of light sources, while presenting a serious problem at the beginning of this century, has ultimately proved to be beneficial to suppliers and users alike.

Mr. Parkinson concluded that there is still a large field for the development of the lighting load, with every promise that the benefits of high standards of illumination can be obtained economically by users on the basis of modern tariffs without any serious repercussions on the engineering and commercial activities of Electricity Boards.

FORTHCOMING EVENTS

CENTRES AND GROUPS

May 3rd

NOTTINGHAM.—Annual General Meeting and Brains Trust. (At the Demonstration Theatre of the East Midlands Electricity Board, Smithy Row, Nottingham.) 6 p.m.

May 8th-11th

Summer Meeting at Harrogate.

May 14th

LEICESTER.—Annual General Meeting. (At the Demonstration Theatre of the East Midlands Electricity Board, Charles Street, Leicester.) 6 p.m.

May 16th

LIVERPOOL.—Annual General Meeting. (At the Liverpool Engineering Society, 9, The Temple, Dale Street, Liverpool.) 6 p.m.

May 17th

NOTTINGHAM.—Spring Outing.

May 23rd

TRANSVAAL.—Brains Trust Evening on Lighting. (At Room 95, Public Library, Johannesburg.) 8 p.m.

June

CARDIFF and SWANSEA.—Summer Outing.

July 25th

TRANSVAAL.—"Cold Cathode Lighting," by N. Flekser. (At Room 95, Public Library, Johannesburg.) 8 p.m.

Correspondence

Illumination Design Calculations

Dear Sir,—Mr. Robinson's letter published in your February issue brings out a number of pertinent points which affect the accuracy of design calculations based upon the "lumen method." Although the method itself has limitations (all of which can be overcome if further experimental work is carried out) it is simple to apply and fulfils a more than useful purpose.

Not forgetting the many other factors contributing to the design of a good lighting scheme it is obviously of some importance to plan so that the results obtained in practice agree, as closely as possible, with the calculated illumination values. This is particularly so when designing installations in accordance with specified or statutory lighting standards. Many factors outside the engineers control, such as fluctuations in mains supply voltage, variation in lumen outputs of lamp and light output ratios of fittings, will effect the actual illumination received in practice. Consequently, we should attempt to be as precise as is possible when deciding the values of the different factors employed in the calculation.

When calculating to determine the total luminous flux required the usual course is to insert, in the formula, the illumination value (E) recommended for the task in question. As few, if any, installations can be planned with absolute uniformity of illumination, there will be positions where workers are receiving less than the average illumination. For this reason, no doubt, statutory regulations refer to minimum values or "the lowest level of maintained illumination." In the circumstances, therefore, if the layout of fittings is such that we are able to ensure a Diversity Ratio of 1.5 it would be in order to assume that the average illumination of a room is 1.25 times.

To allow for the inevitable drop in illumination on the working plane, due to the presence of dirt and dust on the lamps and fittings, we must make an appropriate allowance, the amount of which is bound up with local atmospheric conditions, accessibility of equipment, etc. The value of this factor for a new installation can be pre-determined by a calculation evolving consideration of rate of depreciation and the cost of cleaning and running the fitting. In order to avoid mis-interpretation it is suggested that this factor be called the Dust Factor (D) and not Maintenance Factor as is usually the case.

If we now calculate to determine L, the total flux required, where $L = \frac{A \times 1.25 \times E}{D \times K}$ we obtain a value representing the light output required when the lamps are near the "end of life point." Assuming group replacement is made at periods of, say, 900 and 4,000 hours for tungsten and fluorescent lamps respectively, then when deciding upon the rating and number of lamps required we should use the light output figure appropriate to this period. This means that for the purposes of calculation we do not have to concern ourselves with the "initial" or "average-throughout-life" light output figure.

The symbols A and K. in the above formula refer, of course, to the area of the working plane and the Coefficient of Utilisation, respectively.

London. J. B. HARRIS.

Illumination Levels

Dear Sir,—I have often in the past been fascinated by Mr. G. V. Downer's advocacy of low lighting levels, and his letter in the February issue confirms me in the belief that he is the possessor of unique eyesight.

It is significant that the ancient civilisations all existed in climates where natural lighting intensities were high, and we, in seeking to live in these northern latitudes, have brought with us visual apparatus which, as a result of evolution over many thousands of years, had adapted itself to outdoor use in excellent daylight conditions.

Mr. Downer is surely putting the lamp before the luminaire when he says that the sun "gives off a very greatly unnecessary amount of light." The light is there for our use and vision in living creatures has evolved to make the most of it.

It is, to me at least, an inescapable conclusion therefore that our eyes will work best and with the least strain when the lighting intensity and quality approaches that of daylight, which I interpret as being probably more than 100 lm/ft² provided by suitably placed fluorescent lamps.

Walsall. S. C. DINENAGE.

Fluorescent and Tungsten Lamps

Dear Sir,—In your January issue you criticise the statement that in the United States more fluorescent lamps than tungsten lamps are in use, and you point to the number of fluorescent lamps and tungsten lamps which were sold during the last three years.

If we accept the average life of a tungsten lamp as about 1,000 hours and the life of a fluorescent lamp as about 8,000 hours, then the original statement is quite correct. The ratio of the number of fluorescent lamps and of tungsten lamps in use is then 8 x 98/781 = 784/781, i.e., greater than one.

It may be objected that the average hours in use per day of fluorescent lamps is greater than that of tungsten lamps, and that therefore the number of tungsten lamp luminaires must be greater than the number of fluorescent lamp luminaires. That is not, however, relevant to the argument which concerns the number of lamps actually in use. We should indeed compare the luminous flux from the two types of lamp currently in use, in which case the original statement is correct even if the mean life of fluorescent lamps is less than 8,000 hours.

Prague. I. M. BAUDY.

Dear Sir,—In the January issue of your magazine, under "News and Notes," you question a statement that there are more fluorescent lamps in use in the United States than tungsten lamps. Refuting this statement, you quote figures regarding the sales of fluorescent and tungsten lamps in the United States. It would appear to me that the figures which you have quoted verify the in use statement rather than contradict it. Speaking roughly, the incandescent lamps for general lighting service in the United States have an average life of 900 hours. Fluorescent lamps, on the other hand, have a 7,500 hour rated life at a three-hour cycle. Under normal service conditions the cycle is somewhat longer than the three-hour standard test conditions, so that, approximating again, the actual service life of fluorescent lamps is of the order of 9,000 hours. If we assume that fluorescent lamps are burned the same number of hours annually as incandescent lamps, then it is a simple matter to interpret your 1954 sales and the estimated life values given above into the relative number of lamps in use as shown by the following formula:—

$$\frac{98 \text{ (fluorescent lamps sold)} \times 9{,}000 \text{ (hours life)}}{781 \text{ (incandescent lamps sold)} \times 900 \text{ (hours life)}} = 1.25$$

In other words, there are 25 per cent. more fluorescent lamps than incandescent lamps in use in the United States.

Bloomfield, N.J. R. M. ZABEL.

Lighting Abstracts

Dear Sir,—May I please state how very useful we find the section of your journal which deals with Lighting Abstracts, particularly where this deals with journals which are published in countries abroad. It does bring to our notice the works and details of which we should probably have no knowledge.

I do, therefore, hope you are going to continue with this section which I regard as being extremely useful.

London. L. G. APPLEBEE.

National Illumination Committee of Great Britain*

Report for the Year 1955

By far the most important event in the year, and the one around which the activities of the Committee have centred, was the meeting in Zürich, Switzerland, from June 13 to 22, of the thirteenth session of the International Commission on Illumination.

Twenty-eight countries were represented, including six which had become members of the Commission since the previous session in 1951. Altogether there were over 520 delegates present, including more than 100 from this country. The leader of the British delegation was Dr. S. English and the deputy leader was Mr. F. C. Smith.

For each of the 38 subjects on the programme of the session, a leader and a reporter were nominated from among members of the British delegation. In five of the subjects the committee had been acting as secretariat and the reports were presented by the corresponding leaders; these subjects were: sources of visible radiation, industrial lighting, theatre stage lighting, lighting in hazardous or corrosive situations and street lighting. For a further new subject—railway and dock lighting—the committee, although not secretariat, was responsible for preparing and presenting the report.

In the course of the technical meetings, about 35 papers were presented, six of which were given by British delegates.

The general arrangement of technical meetings was such that secretariat reports and associated papers were grouped together and presented at the same meeting; in some instances, two or even more connected subjects were dealt with in the same meeting. Papers of a general character were presented at separate sessions. By this means it was possible to include in the programme all the subjects and the papers within the time allotted to the session.

At the final plenary meeting I had the honour of being elected the president of the Commission for the ensuing period; Professor Y. Le Grand (France) has become the new honorary secretary, and Mr. von Hemert (Holland) the new honorary treasurer. The vice-presidents are now Dr. L. Fink (Austria), Mr. M. Jacob (Belgium), Professor R. Deaglio (Italy) and Dr. A. A. Brainerd (U.S.A.).

It is likely that the next session will be held in Belgium in 1959.

As a result of decisions taken by the executive committee, the statutes of the Commission will be revised. Included in them will be a definition of the status of individuals in non-member countries who are interested in the work of the Commission, in future to be known as "associates."

Considerable attention was given to the question of reducing the amount of technical material to be dealt with during Sessions of the Commission and to that end the Scope Committee made a number of proposals which were accepted at the final plenary session. In the first place, the subjects

* The N.I.C. is affiliated to the International Commission on Illumination. This report was approved at the annual general meeting of the committee held on Thursday, January 26, 1956.

Constitution of Committee, December 31, 1955

Officers:—

Chairman: DR. J. W. T. WALSH.
Vice-Chairmen: DR. S. ENGLISH and F. C. SMITH.
Hon. Treasurer: DR. S. ENGLISH, Holophane House, Elverton Street, S.W.1.
Hon. Secretary: L. H. MCDERMOTT, National Physical Laboratory, Teddington, Middlesex.
Representatives of Great Britain on the Executive Committee of the International Commission on Illumination: DR. S. ENGLISH and F. C. SMITH.

Nominated by the Sponsoring Organisations:—

Illuminating Engineering Society: G. F. COLE, J. G. HOLMES, E. C. LENNOX, L. H. MCDERMOTT, J. M. WALDRAM.
Institution of Electrical Engineers: C. W. M. PHILLIPS, H. R. RUFF, W. R. STEVENS, DR. J. W. T. WALSH, G. T. WINCH.
Institution of Gas Engineers: J. B. CARNE, A. G. HIGGINS, F. C. SMITH, D. M. THOMPSON, W. H. WELCH.

Nominated by the Co-operating Organisations:—

Admiralty: H. A. L. DAWSON.
Air Ministry: H. A. STAFFORD.
Association of Public Lighting Engineers: E. HOWARD, C. C. SMITH.
British Electrical and Allied Manufacturers' Association: J. M. H. STUBBS.
British Electrical Development Association: V. W. DALE.
British Plastics Federation: DR. W. E. HARPER.
British Standards Institution: J. F. STANLEY.
British Transport Commission: A. H. COLE (*British Railways*), H. E. STYLES (*London Transport Executive*).
Central Electricity Authority and its Area Boards: R. BIRT, M. D. STONEHOUSE.
Department of Scientific and Industrial Research: DR. W. S. STILES (*National Physical Laboratory*), W. ALLEN, DR. R. G. HOPKINSON (*Building Research Station*).
Electric Lamp Manufacturers' Association: L. J. DAVIES, W. J. JONES, E. B. SAWYER.
Electric Light Fittings Association: W. E. J. DRAKE, D. L. TABRAHAM.
Gas Council: J. B. CARNE, F. W. SANSOM.
Glass Manufacturers' Federation: DR. E. PRESTON.
Institution of Municipal Engineers: C. HARPER.
Medical Research Council: DR. W. J. W. FERGUSON, H. C. WESTON.
Ministry of Education: H. E. DANCE, A. P. POTT.
Ministry of Fuel and Power: J. COWAN, H. ROBINSON.
Ministry of Health: D. A. HUGHES.
Ministry of Labour and National Service: M. A. MCTAGGART.
Ministry of Supply: E. S. CALVERT, F. MCGINNETY, J. L. RUSSELL.
Ministry of Transport and Civil Aviation: DR. H. F. GILLBE, W. HADFIELD, H. G. LITCHFIELD.
Ministry of Works: W. E. RAWSON-BOTTOM.
National Coal Board: D. A. STRACHAN, P. N. WYKE.
National Electrical Contractors' Trading Association: A. H. OLSON.
Nuffield Foundation: J. MUSGROVE.
Post Office: A. E. PENNEY.
Society of British Gas Industries: S. F. BAKER, P. C. SUGG.
Society of Glass Technology: DR. S. ENGLISH.

of operating accessories, hospital lighting, floodlighting, popular education and theatre stage lighting were omitted, although the last-named subject has since been reintroduced by the Scope Committee by including it with lighting for photography, etc. The subject of pleasantness in lighting was added to the programme. Then the subjects were divided into two classes, according to whether they were (a) those which are active and in which international agreement is desirable, and (b) those which could be treated by means of progress reports. It was decided that the latter group should continue to be dealt with by the appointment of secretariat countries, which should prepare reports for presentation at the next Session, provided that there is sufficient progress to be reported. For each subject in the former group, a Working Party of experts would be appointed by the Scope Committee, from names supplied by member countries; a secretariat country would be responsible for the general oversight of the work. Each Working Party would prepare a report at an appropriate time, and after approval by the Executive Committee the report would be issued as an official publication of the Commission. As the appearance of these reports would not necessarily be linked with Sessions of the Commission, it might not be necessary to find time on the programme to deal further with these subjects.

The list of subjects, as far as it is known, is as follows:—

Ref. No.	*S or W*	*Subject*	*Secretariat Country*
1.1	W	(a) Definitions; (b) Vocabulary	Switzerland
1.2	S	Measurement of light	Japan
1.3.1	W	Colorimetry	U.S.A.
1.3.2	W	Colour-rendering	Germany
1.3.3	W	Colours of signal lights	Great Britain
1.4.1	S	Photopic and scotopic vision	U.S.S.R.
1.4.2	W	Visual performance	U.S.A.
2.1.1	S	Sources of visible radiation	Sweden
2.1.2	W	Sources of u.v. and i.r. radiation and measurement	Germany
3.1.1.1	W	Pre-determination of illumination and luminance	France
3.1.1.2	W	Causes of discomfort in lighting	U.S.A.
3.1.1.3	W	Pleasantness in lighting	Netherlands
3.1.2	S	Home lighting	Denmark
3.1.3	S	School and office lighting	Finland
3.1.4	S	Industrial lighting (including lighting in hazardous situations)	Czechoslovakia
3.1.5	S	Mine lighting	Belgium
3.1.6	S	Lighting of public buildings	Italy
3.1.8	S	Lighting for selling	South Africa
3.1.9.2	S	Lighting for photography, cinema, television production and theatre stages	Great Britain
3.2	W	Daylight	Australia
3.3.1	W	Street lighting	Great Britain
3.3.2.1	W	Aviation ground lighting	Netherlands
3.3.2.2	S	Lighting for transport (other than automobile and air)	Norway
3.3.3	W	Airborne lighting and signals	U.S.A.
3.3.4	S	Lighting for indoor and outdoor sports	Brazil
3.3.5	W	Automobile headlights and signal lights	Netherlands
3.3.7	W	Signal lights	France
4.1.1.	W	Education in schools, colleges, etc.	Switzerland
4.2	S	Lighting legislation	Israel

S = Secretariat W = Working Party

Recommendations for future action were proposed at most of the technical sessions, and in the main these indicated the lines along which studies should proceed during the ensuing period. Foremost among the more specific decisions reached was that authorising the publication of a Vocabulary; it will consist of two volumes, the first containing the terms and definitions in the three official languages and the second the equivalent terms in these languages and in Italian, Spanish, Dutch, Russian and possibly others. A number of detailed recommendations were adopted in connection with colorimetry and the colours of signal lights, and on the subject of daylight a revised definition of daylight factor was accepted.

As regards the committee itself, certain changes in membership have taken place during the year. In the first place the Nuffield Foundation has become a Co-operating Organisation and has appointed Mr. J. Musgrave as its representative. Dr. Aldington has felt obliged to resign from the committee, and has been succeeded by Mr. G. F. Cole, of the Illuminating Engineering Society, whilst Mr. F. McGinnety acts in place of Brigadier Swettenham for the Ministry of Supply. Professor Cotton, of the Institution of Electrical Engineers, and Mr. Richbell, of the Institution of Gas Engineers, have resigned and have been replaced by Mr. W. R. Stevens and Mr. W. H. Welch respectively. Dr. E. Preston now represents the Glass Manufacturers Federation in place of Dr. Cox.

It is of interest to note that the following new standard has been issued by the British Standards Institution:— BS 2605: Parking lights for vehicles. The following standards have been revised: BS 559: Electric signs and high-voltage luminous-discharge-tube installations, and BS 1006: Determination of fastness to daylight of coloured textiles.

J. W. T. WALSH,
Chairman.

Electrical Engineers Exhibition

(Contined from page 130)

featured was the fluorescent continuous trunking with detachable vitreous reflectors, including the "Slydalong" system whereby reflectors can be moved along to any desired position on the main trunking.

The THORN ELECTRICAL INDUSTRIES, LTD., stand featured a comprehensive display of "Atlas" lighting equipment, including the "Domino" fluorescent lighting system, which enables a wide variety of unified lighting schemes to be evolved from the use of simple basic units, the units being rectangular fluorescent fittings comprising a sheet-steel chassis with black egg-shell finish and a white opal diffuser. Also displayed for the first time was a special range of Forrest Modern fittings by GEORGE FORREST AND SON, LTD., which consist of seven basic components which will produce an endless number of fittings. The recently introduced "Alpha One" sodium lantern was displayed together with the "Beta Two" fluorescent lantern designed for Group B roads.

Scale models, together with photographs, on the POLES LTD. stand illustrated the wide application of "Adastra" products in installations all over the world.

REVO ELECTRIC CO., LTD., displayed a large selection of industrial lighting fittings, together with a representative range of street lighting fittings for Group A and B roads for use with fluorescent mercury, sodium and tungsten lamps. A new blended industrial fitting, together with a circular bulkhead fitting was of interest, as was the new "Keep Left" guard post manufactured in sheet steel with either a vitreous enamel or stoved enamel finish.

Personal

Ekco-Ensign Electric, Ltd., announce the recent appointment of MR. H. V. OLIVER as their Southern Area representative for Dorset, South Wiltshire and West Hampshire.

Evans Electroselenium, Ltd., announce that they have appointed as their Scottish Sales and Service Manager, MR. L. T. JONES, of 9, Wardlaw Drive, Rutherglen, Glasgow. (Tel.: Rutherglen 2773.)

MR R. L. C. TATE has joined the Lighting Sales Division of the A.E.I. Lamp and Lighting Co., Ltd., from the staff of E.L.M.A. where he had specialised in shop lighting.

MR. J. R. SHORT has been appointed Sales Lighting Engineer, Holophane, Ltd. He will represent the Company's interests in Northern England. Mr. Short received his training at Sunderland Technical College and served an apprenticeship with F. Reid Ferens and Co.

CAPTAIN CLIFFORD HIGGINS has retired from the Claude-General Neon Lights, Ltd., after serving for 25 years as its Chief Engineer. He joined the Osram-G.E.C. Lamp Works on leaving the Army in 1919.

Obituary

Dr. E. C. Crittenden

Dr. Eugene Casson Crittenden, internationally known expert on standards of physical measurement, died of cancer on Wednesday, March 28, 1956, at Garfield Hospital, Washington, D.C. He was 75 years of age, and had been ill for several months. Dr. Crittenden had retired as Associate Director of the National Bureau of Standards in December, 1950, but he continued to serve the Bureau as a consultant to the director up to the time of his illness.

Dr. Crittenden is, perhaps, best known for his achievements in the development and adoption of electrical and photometric standards. As vice-president of the International Commission on Illumination, from 1939 to 1948, he played a major rôle in the establishment of modern photometric units, standards, and methods of measurement which culminated in the international adoption of the "candela" in 1948. As chief of the Bureau's Electrical Division for many years, he was a leading scientific figure in replacing the obsolescent international system of electrical units by the so-called absolute electrical units. He was president of the I.E.S. (United States) in 1925 and was awarded its Gold Medal in 1946.

Situations

Vacant

Philips Electrical Ltd. have vacancies in London and Home Counties for LIGHTING SALES REPRESENTATIVES. Candidates aged between 25-30 should have a good technical background and some sales experience of the full range of lighting products including fittings to wholesale and retail outlets. A clean current driving licence is essential. Posts are permanent and pensionable and offer initial salaries in the range £620-830 p.a. Applications should be addressed to Personnel Officer, Century House, Shaftesbury Avenue, London, W.C.2, quoting reference No. 798.

There is a vacancy in the Lamp Engineering Department at Rugby for an HONOURS GRADUATE PHYSICIST or ELECTRICAL ENGINEER for work concerned with the testing of electric lamps. This testing involves measurements of light output, life performance and other characteristics of a wide variety of filament and discharge lamps, both established and development types, under various controlled conditions. The wide scope of the work offers possibilities of rapid advancement. Applicants are invited to write to the Manager, Lamp Engineering Department, British Thomson-Houston Co., Ltd., Rugby, giving details of their age, qualifications and experience, quoting reference LT.

Ekco-Ensign Electric Ltd., London, require LIGHTING SALES ENGINEER to contact consultants, etc. He must be well educated and conversant with modern methods. Write to Box J.73, Willings, 362, Grays Inn Road, W.C.1.

Crompton Parkinson Ltd., Doncaster, have a vacancy in their Lighting Fittings design office for a DESIGN ENGINEER to develop and progress original designs for fluorescent lighting fittings, including special types and those intended for mass production. Specialised experience in this field is not essential but this opportunity is eminently suitable for an engineer with imagination and progressive ideas. The company operates a superannuation fund to which employees contribute when eligible. Write in confidence to the Personnel Officer, giving details of qualifications, experience and age.

A company with an international reputation in the lighting field offers a progressive career to a man as LIGHTING SALES REPRESENTATIVE covering a territory in S.W. London. A knowledge of the lamp and lighting industry though desirable is not as important as personality, presence and integrity. The person appointed will be given adequate training, a salary commensurate with qualifications and ability and scope to develop into a first-class representative holding a progressive income. Replies in confidence should be addressed to Box No. 914, reference No. 813.

FITTINGS DESIGNER AND LIGHTING ENGINEER for the planning and estimating of decorative lighting schemes. Salary up to £1,000 per annum. Apply Box No. 916.

DRAUGHTSMEN, JUNIOR, required for design section of Lighting and Electrical Engineers. Five-day week, progressive post. Apply Box No. 917.

Wanted

Honours Engineering Graduate, 28, Registered Lighting Engineer (I.E.S.), seeks escape from commercial work. Capacity for original thinking. Seven years' experience of photometry and all aspects of interior lighting. Box No. 915.

Agency Facilities

Engineers' Agents, established 10 years in circles covered by this journal, Manchester area, offer representation and branch office facilities to manufacturer of street and industrial lighting fittings. Professional, trade and bank references available. Apply Box No. 913.

NEW PRODUCTS

Tungsten Lamps

Pink-tinted tungsten lamps in 60-, 100- and 150-watt sizes have recently been introduced by several lamps manufacturers. Different trade names are given to the new lamps as follows:—

Thorn and Ecko-Ensign ..	"Softlight"
A.E.I., G.E.C. and Siemens	"Pearl Pink"
Philips	"Rose Tint"

Prices are 1s. 11½d. (60 watts), 2s. 6½d. (100 watts), and 3s. 9d. (150 watts).

They are intended for use in homes, hotels and restaurants.

Spotlight

Courtney, Pope (Electrical) Ltd. announce the introduction of a new spotlight, known as the "Global-Spot," intended primarily for use on window beds in shop windows though it can be mounted on ceilings or walls. It houses a 75-watt silvered spotlamp and is available in a wide range of colours. It can be directed at any angle. The price (less lamp) is 37s. 6d.

Fluorescent lamp

Philips Electrical Limited announce that they are now able to supply from stock a new 6-watt, 9-in. fluorescent lamp. It employs the same circuit as standard fluorescent lamps, using a small, open-type choke and a starter switch. It is available at present only in the "Cool White De Luxe" colour. Price: 11s. 6d. plus 2s. 5d. purchase tax.

Trade Notes

On April 2, 1956, a new company, the A.E.I. Lamp and Lighting Company Limited, came into operation to market the lamp and lighting products of the British Thomson-Houston Co. Ltd, The Edison Swan Electric Co. Ltd. and The Metropolitan-Vickers Electrical Co. Ltd. The brand names "Mazda," "Ediswan" and "Metrovick," associated with the lamp and lighting products of the three companies, are being retained.

By amalgamating the distributive resources of the three companies it has been possible to provide a speedier and more comprehensive service to customers. The British Isles has been divided into seven regions with headquarters in London, Birmingham, Glasgow, Leeds, Manchester, Cardiff and Dublin. In each region is a central warehouse capable of carrying several months' stock of the lamp and lighting products of all three brand names. These warehouses in turn feed area stores strategically placed to provide rapid deliveries to customers. Premises have been modernised and in some places new offices and stores have been acquired.

The Chairman of the new company is Mr. E. H. Ball, Managing Director of The British Thomson-Houston Co. Ltd. and a director of Associated Electrical Industries. The Joint Managing Directors are Mr. V. C. H. Creer and Mr. S. R. Eade.

The other directors are Mr. N. V. Everton (Deputy Chairman), Mr. W. W. Vinsen, Mr. L. J. Davies, Mr. E. S. Little, Mr. F. E. C. Miller and Mr. T. J. Dagley.

The addresses of the company's regional headquarters are listed below :—

Southern Region : 132-135, Long Acre, London, W.C.2. Covent Garden 2831.

South-West Region : National Provincial Bank Buildings, West Bute Street, Cardiff. Cardiff 27495-6-7.

Scotland and N. Ireland Region : 74, Waterloo Street, Glasgow, C.2. Central 4295-8.

North-West Region : Trafford Park Road, Trafford Park, Manchester, 17. Trafford 3281.

North-East Region : 46, Wellington Street, Leeds, 1. Leeds 31541-4.

Midland Region : 26-28, Holloway Head, Birmingham, 1. Midland 7921-5.

Eire : 25, Suffolk Street, Dublin, Eire. Dublin 77279.

The London offices and stores of J. A. Crabtree and Co. Ltd., Walsall, have been transferred to more commodious premises at 230, Tottenham Court Road, W.1. (Tel. Langham 6756).

Luxram Electric Ltd. have moved their London Offices and Warehouse to 72, Great Eastern Street, London, E.C.2. (Tel. Bishopsgate 0678).

Trade Literature

PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, London, W.C.2.—Eight-page booklet describing the use of infra-red lamps for baking, drying, degreasing, preheating, dehydrating and other production processes.

EVANS ELECTROSELENIUM, LTD., Harlow, Essex.— Folder, F106, giving details of a range of photometers for a wide number of applications.

COURTNEY, POPE (ELECTRICAL), LTD., Amhurst Park Works, Tottenham, London, N.15.—A well-illustrated catalogue showing recent installations illustrating a wide selection of lighting designs for opaliter, fluorescent and tungsten fittings. Also a brochure giving full details and information on fittings for the "Frenger" warm acoustic ceiling.

J. A. CRABTREE AND CO., LTD., Lincoln Works, Walsall.—Publication No. 1,174, which covers the most popular items in a wide range of house-wiring accessories. Well illustrated with details and prices.

SQUARE D, LTD., 100, Aldersgate Street, London, E.C.1.—A fully illustrated catalogue giving details of control gear which is flexible in use and easy to install and maintain.

CRYSELCO, LTD., Kempston Works, Bedford.—Leaflet showing the 5 ft. and 4 ft. "Slimline" channel fittings with details and prices.

ASHLEY ACCESSORIES, LTD., Ulverston, Lancs.—Catalogue and Price List giving full details of accessories, including lampholders, ceiling roses, junction boxes, switches and adaptors.

HOLOPHANE, LTD., Elverton Street, Westminster, London, S.W.1.—Four new publications as follows:—SL.855, giving details on single-piece dome refractors; SL.955, giving details on single-piece bowl refractors; SL.256 describes fully the "Lumifractor" street-lighting lantern for narrow Group B roads and finally 55/2 which is an abridged catalogue describing briefly a range of commerical, industrial and street-lighting units suitable for overseas markets.

Miscellany

Sodium Lamps

A wider range of burning positions is now possible when using "Osram" sodium lamps. The General Electric Co., Ltd., announces that improved manufacturing techniques backed by extensive field experience, allow a maximum cap down inclination of five degrees to be specified.

'The Practical Electrician's Pocket Book, 1956'

This edition includes a lighting section which gives instructions and data for the design of lighting installations and advice on how to meet the special requirements of factories, offices, homes, shops, schools, restaurants, churches and hospitals.

City and Guilds Prize Awards

Further to our mention of prizes awarded by the City and Guilds of London Institute for Illuminating Engineering in the February issue we also congratulate Mr. Ronald Croft of Stow College of Engineering, Glasgow for being awarded the Institute's Silver Medal for the First Prize for the Final Examination which he shares with Mr. J. H. Howard, of Northampton Polytechnic.

Erratum

The electrical installation featured on page 73 of the March issue was carried out by Victor Electric Co., of Willesden and not as mentioned.

POSTSCRIPT By "Lumeritas"

I HAVE been gently taken to task by Dr. Ward Harrison for some of my comments on the "maintenance factor" in February. In that issue of the Journal I followed Willard Allphin in saying that "a maintenance factor of 0.5 would mean that, while the initial illumination value would be double the average maintained value, the illumination would fall to zero before actual maintenance was done." Dr. Harrison points out that this would be true only if "luminaire depreciation is a straight line" which, as a rule, it is not. Let me hasten to say that I misrepresented Mr. Allphin to the extent of omitting the words "taken literally" with which he prefaced the statement I paraphrased. Of course, Mr. Allphin is well aware (and so am I) that depreciation curves really are curves, as is evident from his article which prompted my comments ("Are We Confusing Average with Minimum Footcandles?", Lighting, 68, 21, 1955).

The fact is that the case instanced was a *reductio ad absurdum* to give emphasis to the argument that we need to know at what level of illumination cleaning must be done if the designed average illumination is actually to be "maintained." Surely this minimum allowable illumination is a crucial factor in maintenance. What it will be in any given case depends on the shape of the relevant depreciation curve, and if we do not know this shape we must make a reasonable assumption about it so as to be able to specify to what extent depreciation can be permitted without lowering the "average illumination maintained." If a minimum illumination at which action must be taken is not specified, how is the intended "average illumination" to be maintained except by chance?

According to the current I.E.S. Code, para. 17, "cleaning and servicing of luminaires should be carried out at suitable intervals to ensure that the illumination provided by the installation in service at no time falls below the recommended value." This, then, is quite definite—the recommended value is also the minimum value, indicative of the need for "maintenance," "so that (para. 16) the average illumination in service will not fall below the recommended value." This average in service will, of course, exceed the recommended value, and this is all to the good. So, in this country, if the I.E.S. Code is followed, we do what Allphin pleads for in the U.S.A., that is to say, "design for *minimum* rather than average footcandles." But, we do this by using what is really a "maximum factor" rather than a factor purporting to specify what will be the ratio of "the number of footcandles averaged through the use period" to the initial illumination.

IN his latest annual report the Chief Inspector of Factories again records that substantial progress is being made in providing good artificial lighting. He remarks that, due to the rapid progress in lighting technique, a factory considered well lit 15 years ago is now, in comparison with modern standards, a dull place; opinion as to what is good and what is merely average continually alters with each new advance in technique. In these days of full employment the amenities of the factory have assumed an importance far exceeding that formerly attached to them, and there is no doubt that good lighting for the work and a genially bright environment rank high among these amenities.

FLUORESCENT lighting for shopping streets seems well on the way to becoming standard practice. Every week one reads of new installations—one of them has been completed recently even in the High Street of my own home town, which was miserably lighted previously. But the advantages of fluorescent lighting have given it entry to places of very different kind and public interest. It is on trial in Big Ben and is very likely to be adopted permanently for illuminating the famous clock faces. Even more interesting, in view of the need for good colour rendering, is the fact that fluorescent lighting is being installed throughout the National Gallery. Some of the rooms have been remodelled for air-conditioning and the problem of artificial lighting has been most successfully solved by the Ministry of Works by the use of fluorescent tubes concealed behind louvres in the new laylights. In the other rooms the problem of installation design is more difficult and, although a number of experiments have been made, the present installations are not intended to be final.

THE "pink pearl" lamp, which is a newcomer to the range of general service tungsten lamps, is presumably expected to have a fairly wide appeal, especially, perhaps, in the domestic sphere. A rather "warmer" light than that of the ordinary tungsten lamp certainly is preferred by many of the fairer sex—at any rate in the home—and, of course, it is now often obtained by the use of some sort of pink "shade." This is a device which all too often fails to screen the lamp itself from view except when the eyes are downcast. This is true of the very familiar, because very prevalent, bell-bottomed "shades" and truncated-cone "shades," when they are pendant in the centre of a room. Inverting the truncated-cone type gives a better cut-off, and the shade looks quite well this way in my opinion, although some people of my acquaintance think it looks odd. I hope the introduction of a pearl lamp which looks pink will not encourage the perpetuation of domestic lighting in which the lamp itself is too easily seen.

IF the recommendations of the London and Home Counties Traffic Advisory Committee are accepted, the erection of street lighting will no longer automatically extend the lengths of road subject to the 30 m.p.h. speed limit, except on unclassified roads. This Committee has also recommended that the Minister of Transport should use his powers to ensure that speed limit signs are specially lit whenever the street lighting is inadequate, and that repeater signs should be erected on lengths of road which are subject to the 30 m.p.h. limit but on which there is no street lighting. These are sensible recommendations.